

PROCEEDINGS
OF THE
AMERICAN SOCIETY
OF
CIVIL ENGINEERS

(INSTITUTED 1852)

VOL. XL—No. 4

APRIL, 1914

Edited by the Secretary, under the direction of the Committee on Publications.

Reprints from this publication, which is copyrighted, may be made on condition that the full title of Paper, name of Author, page reference, and date of presentation to the Society, are given.

CONTENTS

Society Affairs.....	Pages 231 to 266.
Papers and Discussions.....	Pages 815 to 1248.

NEW YORK 1914

Entered according to Act of Congress, in the year 1914, by the AMERICAN SOCIETY OF CIVIL ENGINEERS, in the office of the Librarian of Congress, at Washington.

American Society of Civil Engineers

OFFICERS FOR 1914

President, HUNTER McDONALD

Vice-Presidents

Term expires January, 1915:

J. WALDO SMITH
CHARLES H. RUST

Term expires January, 1916:

CHARLES F. LOWETH
GARDNER S. WILLIAMS

Secretary, CHARLES WARREN HUNT

Treasurer, JOHN F. WALLACE

Directors

Term expires January, 1915:

LINCOLN BUSH
T. KENNARD THOMSON
EMIL GERBER
WILLIAM CAIN
E. C. LEWIS
W. A. CATTELL

Term expires January, 1916:

JAMES H. EDWARDS
HENRY W. HODGE
LEONARD METCALF
HENRY R. LEONARD
EDWARD H. CONNOR
SAMUEL H. HEDGES

Term expires January, 1917:

GEORGE W. FULLER
ARTHUR S. TUTTLE
CHARLES H. KEEFER
MORTIMER E. COOLEY
EUGENE E. HASKELL
RICHARD MONTFORT

Assistant Secretary, T. J. McMINN

Standing Committees

(THE PRESIDENT OF THE SOCIETY IS *ex-officio* MEMBER OF ALL COMMITTEES)

On Finance:

LINCOLN BUSH
HENRY W. HODGE
LEONARD METCALF
EMIL GERBER
GEORGE W. FULLER

On Publications:

JAMES H. EDWARDS
WILLIAM CAIN
ARTHUR S. TUTTLE
HENRY R. LEONARD
GARDNER S. WILLIAMS

On Library:

J. WALDO SMITH
T. KENNARD THOMSON
E. C. LEWIS
M. E. COOLEY
CHAS. WARREN HUNT

Special Committees

ON CONCRETE AND REINFORCED CONCRETE: Joseph R. Worcester, J. E. Greiner, W. K. Hatt, Olaf Hoff, Richard L. Humphrey, Robert W. Lesley, Emil Swensson, A. N. Talbot.

ON ENGINEERING EDUCATION: Desmond FitzGerald, Onward Bates, D. W. Mead.

ON STEEL COLUMNS AND STRUTS: Austin L. Hewman, James H. Edwards, Emil Gerber, Charles F. Loweth, Ralph Modjeski, Frank C. Osborn, George H. Pegram, Lewis D. Rights, George F. Swain, Emil Swensson, Joseph R. Worcester.

ON BITUMINOUS MATERIALS FOR ROAD CONSTRUCTION: W. W. Crosby, A. W. Dean, H. K. Bishop, A. H. Blanchard, George W. Tillson, Nelson P. Lewis, Charles J. Tilden.

ON VALUATION OF PUBLIC UTILITIES: Frederic P. Stearns, H. M. Byllesby, Thomas H. Johnson, Leonard Metcalf, Alfred Noble, William G. Raymond, Jonathan P. Snow.

TO INVESTIGATE CONDITIONS OF EMPLOYMENT OF, AND COMPENSATION OF, CIVIL ENGINEERS: Alfred Noble, S. L. F. Deyo, Dugald C. Jackson, William V. Judson, George W. Tillson, C. F. Loweth, John A. Bensenl.

TO CODIFY PRESENT PRACTICE ON THE BEARING VALUE OF SOILS FOR FOUNDATIONS, ETC.: Robert A. Cummings, Edward C. Shankland, Edwin Duryea, Jr., James C. Meem, Walter J. Douglas, Samuel T. Wagner, Frank M. Kerr.

ON A NATIONAL WATER LAW: F. H. Newell, George G. Anderson, Charles W. Comstock, Clemens Herschel, W. C. Hoad, Robert E. Horton, John H. Lewis, Charles D. Marx, Gardner S. Williams.

ON FLOODS AND FLOOD PREVENTION: C. McD. Townsend, John A. Bensenl, T. G. Dabney, C. E. Grunsky, Frank M. Kerr, Morris Knowles, J. B. Lippincott, Daniel W. Mead, John A. Ockerson, Arthur T. Safford, Charles Saville, F. L. Sellow.

TO REPORT ON STRESSES IN RAILROAD TRACK: A. N. Talbot, A. S. Baldwin, J. B. Berry, G. H. Bremner, John Brunner, W. J. Burton, Charles S. Churchill, W. C. Cushing, Emil Gerber, Robert W. Hunt, George W. Kittredge, William McNab, G. J. Ray, F. E. Turneure, J. E. Willoughby.

The House of the Society is open from 9 A. M. to 10 P. M. every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

HOUSE OF THE SOCIETY—220 WEST FIFTY-SEVENTH STREET, NEW YORK.

TELEPHONE NUMBER.....5913 Columbus.

CABLE ADDRESS....."Ceas, New York."

AMERICAN SOCIETY OF CIVIL ENGINEERS

INSTITUTED 1852

PROCEEDINGS

This Society is not responsible for any statement made or opinion expressed in its publications.

SOCIETY AFFAIRS

CONTENTS

	PAGE
Minutes of Meetings:	
Of the Society, March 18th and April 1st and 2d, 1914.....	231
Of the Board of Direction, March 4th and April 1st, 1914.....	235
Announcements:	
Hours during which the Society House is open.....	239
Future Meetings.....	239
Annual Convention.....	239
Searches in the Library.....	239
Papers and Discussions.....	240
Local Associations of Members of the American Society of Civil Engineers.....	240
Privileges of Engineering Societies Extended to Members.....	243
Accessions to the Library:	
Donations.....	245
By purchase.....	247
Membership (Additions, Changes of Address, Resignations, Deaths).....	248
Recent Engineering Articles of Interest.....	259

MINUTES OF MEETINGS

OF THE SOCIETY

March 18th, 1914.—The meeting was called to order at 8.30 p. m.; T. Kennard Thomson, Director, in the chair; Chas. Warren Hunt, Secretary; and present, also, 106 members and 9 guests.

A paper by C. G. Wrentmore, M. Am. Soc. C. E., and Messrs. Hugh Brodie and C. O. Carey, entitled "Report on a Series of Tests on Concrete Columns Reinforced with a Spiral of Steel", was presented by the Secretary, who also read a communication on the subject from Edward Godfrey, M. Am. Soc. C. E. The paper was discussed orally by A. W. Buel, M. Am. Soc. C. E.

The Secretary announced the following deaths:

WILLIAM AUGUST HUNICKE, of St. Louis, Mo., elected Associate Member, March 2d, 1904; Member, January 7th, 1913; died March 9th, 1914.

GEORGE WESTINGHOUSE, of Pittsburgh, Pa., elected Member, January 7th, 1891; died March 12th, 1914.

Adjourned.

American Society of Civil Engineers

OFFICERS FOR 1914

President, HUNTER McDONALD

Vice-Presidents

Term expires January, 1915:

J. WALDO SMITH
CHARLES H. RUST

Term expires January, 1916:

CHARLES F. LOWETH
GARDNER S. WILLIAMS

Secretary, CHARLES WARREN HUNT

Treasurer, JOHN F. WALLACE

Directors

Term expires January,
1915:

LINCOLN BUSH
T. KENNARD THOMSON
EMIL GERBER
WILLIAM CAIN
E. C. LEWIS
W. A. CATTELL

Term expires January
1916:

JAMES H. EDWARDS
HENRY W. HODGE
LEONARD METCALF
HENRY R. LEONARD
EDWARD H. CONNOR
SAMUEL H. HEDGES

Term expires January,
1917:

GEORGE W. FULLER
ARTHUR S. TUTTLE
CHARLES H. KEEFER
MORTIMER E. COOLEY
EUGENE E. HASKELL
RICHARD MONTFORT

Assistant Secretary, T. J. MCMINN

Standing Committees

(THE PRESIDENT OF THE SOCIETY IS *ex-officio* MEMBER OF ALL COMMITTEES)

On Finance:

LINCOLN BUSH
HENRY W. HODGE
LEONARD METCALF
EMIL GERBER
GEORGE W. FULLER

On Publications:

JAMES H. EDWARDS
WILLIAM CAIN
ARTHUR S. TUTTLE
HENRY R. LEONARD
GARDNER S. WILLIAMS

On Library:

J. WALDO SMITH
T. KENNARD THOMSON
E. C. LEWIS
M. E. COOLEY
CHAS. WARREN HUNT

Special Committees

ON CONCRETE AND REINFORCED CONCRETE: Joseph R. Worcester, J. E. Greiner, W. K. Hatt, Olaf Hoff, Richard L. Humphrey, Robert W. Lesley, Emil Swensson, A. N. Talbot.

ON ENGINEERING EDUCATION: Desmond FitzGerald, Onward Bates, D. W. Mead.

ON STEEL COLUMNS AND STRUTS: Austin L. Bowman, James H. Edwards, Emil Gerber, Charles F. Loweth, Ralph Modjeski, Frank C. Osborn, George H. Pegram, Lewis D. Rights, George F. Swain, Emil Swensson, Joseph R. Worcester.

ON BITUMINOUS MATERIALS FOR ROAD CONSTRUCTION: W. W. Crosby, A. W. Dean, H. K. Bishop, A. H. Blanchard, George W. Tillson, Nelson P. Lewis, Charles J. Tilden.

ON VALUATION OF PUBLIC UTILITIES: Frederic P. Stearns, H. M. Byllesby, Thomas H. Johnson, Leonard Metcalf, Alfred Noble, William G. Raymond, Jonathan P. Snow.

TO INVESTIGATE CONDITIONS OF EMPLOYMENT OF, AND COMPENSATION OF, CIVIL ENGINEERS: Alfred Noble, S. L. F. Deyo, Dugald C. Jackson, William V. Judson, George W. Tillson, C. F. Loweth, John A. Bensele.

TO CODIFY PRESENT PRACTICE ON THE BEARING VALUE OF SOILS FOR FOUNDATIONS, ETC.: Robert A. Cummings, Edward C. Shankland, Edwin Duryea, Jr., James C. Meem, Walter J. Douglas, Samuel T. Wagner, Frank M. Kerr.

ON A NATIONAL WATER LAW: F. H. Newell, George G. Anderson, Charles W. Comstock, Clemens Herschel, W. C. Hoad, Robert E. Horton, John H. Lewis, Charles D. Marx, Gardner S. Williams.

ON FLOODS AND FLOOD PREVENTION: C. McD. Townsend, John A. Bensele, T. G. Dabney, C. E. Grunsky, Frank M. Kerr, Morris Knowles, J. B. Lippincott, Daniel W. Mead, John A. Ockerson, Arthur T. Safford, Charles Saville, F. L. Sellow.

TO REPORT ON STRESSES IN RAILROAD TRACK: A. N. Talbot, A. S. Baldwin, J. B. Berry, G. H. Bremner, John Brunner, W. J. Burton, Charles S. Churchill, W. C. Cushing, Emil Gerber, Robert W. Hunt, George W. Kittredge, William McNab, G. J. Ray, F. E. Turneure, J. E. Whiloughby.

The House of the Society is open from 9 A. M. to 10 P. M. every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

HOUSE OF THE SOCIETY—220 WEST FIFTY-SEVENTH STREET, NEW YORK.

TELEPHONE NUMBER.....5913 Columbus.

CABLE ADDRESS....."Ceas, New York."

AMERICAN SOCIETY OF CIVIL ENGINEERS

INSTITUTED 1852

PROCEEDINGS

This Society is not responsible for any statement made or opinion expressed in its publications.

SOCIETY AFFAIRS

CONTENTS

	PAGE
Minutes of Meetings:	
Of the Society, March 18th and April 1st and 2d, 1914.....	231
Of the Board of Direction, March 4th and April 1st, 1914.....	235
Announcements:	
Hours during which the Society House is open.....	239
Future Meetings.....	239
Annual Convention.....	239
Searches in the Library.....	239
Papers and Discussions.....	240
Local Associations of Members of the American Society of Civil Engineers.....	240
Privileges of Engineering Societies Extended to Members.....	243
Accessions to the Library:	
Donations.....	245
By purchase.....	247
Membership (Additions, Changes of Address, Resignations, Deaths).....	248
Recent Engineering Articles of Interest.....	259

MINUTES OF MEETINGS OF THE SOCIETY

March 18th, 1914.—The meeting was called to order at 8.30 P. M.; T. Kennard Thomson, Director, in the chair; Chas. Warren Hunt, Secretary; and present, also, 106 members and 9 guests.

A paper by C. G. Wrentmore, M. Am. Soc. C. E., and Messrs. Hugh Brodie and C. O. Carey, entitled "Report on a Series of Tests on Concrete Columns Reinforced with a Spiral of Steel", was presented by the Secretary, who also read a communication on the subject from Edward Godfrey, M. Am. Soc. C. E. The paper was discussed orally by A. W. Buel, M. Am. Soc. C. E.

The Secretary announced the following deaths:

WILLIAM AUGUST HUNICKE, of St. Louis, Mo., elected Associate Member, March 2d, 1904; Member, January 7th, 1913; died March 9th, 1914.

GEORGE WESTINGHOUSE, of Pittsburgh, Pa., elected Member, January 7th, 1891; died March 12th, 1914.

Adjourned.

April 1st, 1914.—The meeting was called to order at 8.30 P. M.; Vice-President Gardner S. Williams in the chair; Charles Warren Hunt, Secretary; and present, also, 121 members and 14 guests.

The minutes of the meetings of February 18th and of March 4th and 11th, 1914, were approved as printed in *Proceedings* for March, 1914.

A paper by F. Lavis, M. Am. Soc. C. E., entitled "The Gauge of Railways, with Particular Reference to Those of Southern South America," was presented by the author who illustrated his remarks with lantern slides. The paper was discussed orally by Philip W. Henry, M. Am. Soc. C. E.

The Secretary announced the election of the following candidates on April 1st, 1914:

AS MEMBERS

ALEXANDER ALLAIRE, Vancouver, B. C., Canada

JACOB THOMPSON BULLEN, Shreveport, La.

LEE LLEWELLYN, Pittsburgh, Pa.

CHARLES HARVEY MACCULLOCH, Schenectady, N. Y.

HENRY MATSON WAITE, Cincinnati, Ohio

AS ASSOCIATE MEMBERS

FRANCIS NEAL BALDWIN, Alexandria, La.

CHARLES DANA SAYRES CLARKSON, Washington, D. C.

ARTHUR MANDEVILLE COMPTON, Davenport, Iowa

DEXTER PARSHALL COOPER, New York City

CLARE HARMON CURRIER, Webster City, Iowa

WILLIS JOHNSON DEAN, San Diego, Cal.

CARLTON ROBB DEGRAFF, Amsterdam, N. Y.

CHARLES EDSON DOUGLAS, Meadville, Pa.

HOWARD HOWELL GEORGE, Newark, N. J.

DAVID HERRICK GOODWILLIE, Toledo, Ohio

ROSS ELROY HAMILTON, Coshocton, Ohio

WILLIAM FREDERICK HICKS, Lethbridge, Alberta, Canada

WILLIAM FLEMING HOLLIDAY, Palmerton, Pa.

AUGUSTUS CRANE HONE, New York City

JOSÉ PETRONIO KATIGBAK, Manila, Philippine Islands

MICHAEL NIKANOROVITCH LEBEDEFF, Denver, Colo.

CHARLES WELLS LINSLEY, Oswego, N. Y.

DAVID LUDWIG LOEWE, Berlin, Germany

DAVID CADENHEAD MACDOUGALL, Westfield, N. J.

PATRICK JAMES MALLEY, Boston, Mass.

HAMILTON VINCENT MILES, Manila, Philippine Islands

ROBERT ORRELL MORRISON, Monroe, La.

WILLIAM HENRY NALDER, Great Falls, Mont.

CHARLES FREDERICK PUFF, JR., Philadelphia, Pa.

MARTIN JOHN REINHART, Oklahoma City, Okla.
KARL DEWITT SCHWENDENER, Los Angeles, Cal.
CLARENCE EDMUND SEAGE, New York City
SAMUEL ALAN SLOAN, Philadelphia, Pa.
ALEXANDER LINN TROUT, Detroit, Mich.
HOWARD MOORE TURNER, Turners Falls, Mass.
JAMES HUBERT VAN WAGENEN, Washington, D. C.
RODMAN WILEY, Frankfort, Ky.
GEORGE JOHN WOEHRLIN, Brooklyn, N. Y.
BENJAMIN RUSSELL WOOD, Manila, Philippine Islands
BERTHOLD WUTH, Oakland, Cal.

As JUNIORS

EDGAR DOW GILMAN, Madison, Wis.
ARTHUR FRANCIS HOLLAND, New Martinsville, W. Va.
WALTER EDGAR JESSUP, South Pasadena, Cal.
HARVEY STONE JOHNSON, Utica, N. Y.
JOHN JACOB KRAUSS, Ann Arbor, Mich.
FREDERIC OGANAM XAVIER McLOUGHLIN, New York City
EDWARD ANDERS MALMQUIST, Astoria, N. Y.
VICTOR MAYPER, New York City
GEORGE JOHN MEISE, New York City.
EMILE LEONARD RIMBAULT, Jr., New York City
LEON EMERSON SWARTZ, Altoona, Pa.
CHARLES RANDOLPH THOMAS, 3d, State College, Pa.
GEORGE SPARKMAN WARD, Boca Grande, Fla.
JOHN THAD WHITNEY, Wheeling, W. Va.

The Secretary announced the transfer of the following candidates on April 1st, 1914:

FROM ASSOCIATE MEMBER TO MEMBER

GUSTAV STORM BERGENDAHL, Chicago, Ill.
RALPH PETERS BLACK, Charleston, W. Va.
CHARLES BERNARD BUERGER, New York City
LA VERN JOHN CHARLES, Elephant Butte, N. Mex.
WASHINGTON IRVING LEX, Philadelphia, Pa.
SAMUEL JACOB OTT, Rutherford, N. J.
JOSHUA FIELDEN RAMSBOTHAM, Melbourne, Victoria, Australia
FREDERICK HOWARD TILLINGHAST, Lahontan, Nev.

FROM JUNIOR TO ASSOCIATE MEMBER

JOHN NIXON BROOKS, Trenton, N. J.
NATHAN BOOKER BUCHANAN, Tupelo, Miss.
LESTER LYMAN COLEMAN, Maricopa, Cal.

TORRIS EIDE, New York City
GEORGE RODMAN GOETHALS, Culebra, Canal Zone, Panama
HARRY MILTON LYNDE, West Raleigh, N. C.
KENNETH DUNHAM OWEN, Montclair, N. J.
RALPH EDGAR SPAULDING, Suffield, Conn.
NEWTON BENJAMIN WADE, Millville, N. J.

The Secretary announced the following deaths:

WILLIAM DUNBAR JENKINS, of Natchez, Miss., elected Member, September 7th, 1887; died March 12th, 1914.

BENJAMIN FRANKLIN MORSE, of East Cleveland, Ohio, elected Member, July 12th, 1877; died February 24th, 1914.

ROGER TIFFT HOLLOWAY, of New York City, elected Junior, May 31st, 1910; Associate Member, May 7th, 1913; died March 13th, 1914.

Adjourned.

SPECIAL MEETINGS

April 2d, 1914.—The meeting was called to order at 2.30 P. M.; Vice-President Gardner S. Williams in the chair; Chas. Warren Hunt, Secretary; and present, also, 51 members and 8 guests.

The Chairman announced that the meeting had been called for the purpose of discussing the Progress Report of the Special Committee on the Valuation of Public Utilities.

The discussion was opened by C. Tombo, Assoc. M. Am. Soc. C. E., who read a communication on the subject from Charles Hansel, M. Am. Soc. C. E. The report was discussed also by Messrs. George F. Swain, D. W. Lum, J. H. H. Muirhead, J. N. Dodd, C. R. Harte, S. Whinery, J. M. Schreiber, and M. L. Byers.

On motion, duly seconded, the meeting was adjourned until 8.30 P. M.

April 2d, 1914.—The meeting was called to order at 8.30 P. M.; Vice-President Williams in the chair; T. J. McMinn, Assistant Secretary, acting as Secretary; and present, also, 41 members and 4 guests.

The Assistant Secretary read a communication on the subject from H. M. Stone, M. Am. Soc. C. E., and the discussion was continued by Messrs. J. H. H. Muirhead, T. Kennard Thomson, J. P. Snow, George F. Swain, Gardner S. Williams, and Frederic P. Stearns.

Adjourned.

OF THE BOARD OF DIRECTION

(Abstract)

March 4th, 1914.—The Board met at 3.15 p. m.; President McDonald in the chair; Chas. Warren Hunt, Secretary; and present, also, Messrs. Bush, Edwards, Endicott, Fuller, Gerber, Hodge, Keefer, Leonard, Ockerson, Smith, Swain, Thomson, Tuttle, and Williams.

The Committee appointed to consider the question of the payment of mileage to Directors attending Annual Conventions reported that in its opinion the payment of such mileage was not justified by the conditions, nor in the best interests of the Society, and on motion, duly seconded, the report was received and its recommendations adopted as the action of the Board.

The following Resolutions were adopted:

"Resolved: That it is the sense of this meeting of the Board of Direction that it would be wise to enlarge the work of the Society by the encouragement of the work of its Special Committees, including research work, and by the appropriation of some of its surplus funds for this purpose."

"Resolved: That the Finance Committee be requested to report to the Board the amount which, in its opinion, it would be proper to appropriate for such purpose during 1914."

Letters of protest against the issue of an unsigned postal card relating to the Amendments to the Constitution were presented, and the matter was referred to the Publication Committee for report.

The Constitution of the Spokane Association of Members of the American Society of Civil Engineers was approved.

The resignation of Frank M. Kerr, M. Am. Soc. C. E., as Chairman of the Special Committee on Floods and Flood Prevention, was received and accepted. C. McD. Townsend, M. Am. Soc. C. E., was appointed Chairman of that Committee to fill the vacancy.

Ballots for membership were canvassed, resulting in the election of 6 Members, 20 Associate Members, and 14 Juniors, and the transfer of 7 Juniors to the grade of Associate Member.

Five Associate Members were transferred to the grade of Member. Applications were considered, and other routine business transacted.

Adjourned.

April 1st, 1914.—The Board met at 3.35 p. m.; Vice-President Williams in the chair; Chas. Warren Hunt, Secretary; and present, also, Messrs. Bush, Edwards, Endicott, Fuller, Gerber, Haskell, Hodge, Keefer, Leonard, Swain, Thomson, and Tuttle.

William Douglas Pickett, M. Am. Soc. C. E., was elected an Honorary Member by the unanimous vote of the entire Board of Direction and all living Past-Presidents.

Upon the recommendation of the Publication Committee the following was unanimously adopted as the action of the Board:

"That the unofficial use of the Society's Mailing List be restricted to the membership of the Society for the transmission of information on Society matters in communications bearing the name of the member or members responsible therefor."

"That in view of certain criticisms of the 'mode of procedure' heretofore prescribed by the Board in the appointment of the Nominating Committee (Article VII, Sec. 2 of the Constitution), and as to the form used in preparing certain letter-ballots, the following resolutions be adopted:

"Resolved: That in the matter of the submission of suggestions for the Nominating Committee, a date for closing the receipt of both the first and second set of suggestions be fixed each year by the Board of Direction, and that all such suggestions be opened and canvassed by the Board.

"Resolved: That the provisions of Article VII, Sec. 6, of the Constitution, which relate to letter-ballots for election of officers, shall in future apply to all letter-ballots on other matters submitted to the vote of the Corporate Members of the Society."

The Publication Committee reported that it had spent more than six months in investigating the cost of printing and in securing Competitive Bids, both from printers in New York City and out of town, and recommended that a new contract be entered into with the Evening Post Job Printing Office (which is now doing the work), said contract to run until August, 1915.

Upon the recommendation of the Publication Committee, a circular was ordered, to ascertain the views of the entire membership as to the use of this paper in our publications.

A Code of Ethics, presented some time ago by a Committee composed of Messrs. Endicott, Wallace, and Hodge, was considered and revised, and the following was ordered sent out to the membership of the Society, and to be brought up at the Business Meeting of the Annual Convention with the recommendation of the Board that it be adopted by the Society:

Code of Ethics

"It shall be considered unprofessional and inconsistent with honorable and dignified bearing for any member of the American Society of Civil Engineers:

"1. To act for his clients in professional matters otherwise than as a faithful agent or trustee, or to accept any remuneration other than his stated charges for services rendered his clients.

"2. To attempt to injure falsely or maliciously, directly or indirectly, the professional reputations, prospects, or business, of another Engineer.

"3. To attempt to supplant another Engineer after definite steps have been taken toward his employment.

"4. To compete with another Engineer for employment on the basis of professional charges, by reducing his usual charges and in this manner attempting to underbid after being informed of the charges named by another.

"5. To review the work of another Engineer for the same client, except with the knowledge or consent of such Engineer, or unless the connection of such Engineer with the work has been terminated.

"6. To advertise in self-laudatory language, or in any other manner derogatory to the dignity of the profession."

A report was received from a Committee consisting of Messrs. Bates, Bensel, Endicott, Ockerson, and Swain, relating to the payment of mileage and to other expenses of Special Committees, which report, after slight modification, was approved and adopted as the action of the Board. As adopted, the action reads as follows:

"The Board of Direction of the American Society of Civil Engineers having considered the advisability of allowing mileage to members of Special Committees, and also the advisability of allotting funds to such Committees to cover the necessary general expenses incident to the work assigned them, has adopted the following:

"(1) Since one of the declared objects of the Society is 'the advancement of engineering knowledge and practice', it is recommended that at the beginning of each calendar year a budget be prepared and adopted by the Board of Direction covering the various classes of expenditures, including a fund for research or Special Committee work, of such amount as in the opinion of the Board can properly be diverted to such purposes.

"(2) That when a Special Committee is appointed it shall at once submit to the Board of Direction a project outlining the scope and character of the work proposed, together with an estimate of the cost thereof.

"(3) On the receipt of such project covering the nature of the work proposed and the estimated cost thereof, the Board of Direction may alter or amend such project and define the general lines along which the work should be conducted.

"(4) When a project has been approved by the Board of Direction the said Board may allot from the surplus funds of the Society such amount as in its opinion may be necessary and proper for the work proposed.

"(5) Any part of the allotment made for the use of a Special Committee may be used for the payment of personal expenses to the extent of mileage at a rate of three cents per mile, when transportation is actually paid by members of the Committee.

"(6) Satisfactory vouchers covering the expenditures in detail must be submitted to the Board, and must be approved by the Committee on Finance before being paid; provided, however, that the Board of Direction may advance to such Committees such sums as may, in its opinion, be deemed necessary, subject, however, to such final settlement and approval as herein provided.

Upon the recommendation of the Publication Committee the following was unanimously adopted as the action of the Board:

"That the unofficial use of the Society's Mailing List be restricted to the membership of the Society for the transmission of information on Society matters in communications bearing the name of the member or members responsible therefor."

"That in view of certain criticisms of the 'mode of procedure' heretofore prescribed by the Board in the appointment of the Nominating Committee (Article VII, Sec. 2 of the Constitution), and as to the form used in preparing certain letter-ballots, the following resolutions be adopted:

"*Resolved:* That in the matter of the submission of suggestions for the Nominating Committee, a date for closing the receipt of both the first and second set of suggestions be fixed each year by the Board of Direction, and that all such suggestions be opened and canvassed by the Board.

"*Resolved:* That the provisions of Article VII, Sec. 6, of the Constitution, which relate to letter-ballots for election of officers, shall in future apply to all letter-ballots on other matters submitted to the vote of the Corporate Members of the Society."

The Publication Committee reported that it had spent more than six months in investigating the cost of printing and in securing Competitive Bids, both from printers in New York City and out of town, and recommended that a new contract be entered into with the Evening Post Job Printing Office (which is now doing the work), said contract to run until August, 1915.

Upon the recommendation of the Publication Committee, a circular was ordered, to ascertain the views of the entire membership as to the use of thin paper in our publications.

A Code of Ethics, presented some time ago by a Committee composed of Messrs. Endicott, Wallace, and Hodge, was considered and revised, and the following was ordered sent out to the membership of the Society, and to be brought up at the Business Meeting of the Annual Convention with the recommendation of the Board that it be adopted by the Society:

Code of Ethics

"It shall be considered unprofessional and inconsistent with honorable and dignified bearing for any member of the American Society of Civil Engineers:

"1. To act for his clients in professional matters otherwise than as a faithful agent or trustee, or to accept any remuneration other than his stated charges for services rendered his clients.

"2. To attempt to injure falsely or maliciously, directly or indirectly, the professional reputations, prospects, or business, of another Engineer.

"3. To attempt to supplant another Engineer after definite steps have been taken toward his employment.

"4. To compete with another Engineer for employment on the basis of professional charges, by reducing his usual charges and in this manner attempting to underbid after being informed of the charges named by another.

"5. To review the work of another Engineer for the same client, except with the knowledge or consent of such Engineer, or unless the connection of such Engineer with the work has been terminated.

"6. To advertise in self-laudatory language, or in any other manner derogatory to the dignity of the profession."

A report was received from a Committee consisting of Messrs. Bates, Bensel, Endicott, Ockerson, and Swain, relating to the payment of mileage and to other expenses of Special Committees, which report, after slight modification, was approved and adopted as the action of the Board. As adopted, the action reads as follows:

"The Board of Direction of the American Society of Civil Engineers having considered the advisability of allowing mileage to members of Special Committees, and also the advisability of allotting funds to such Committees to cover the necessary general expenses incident to the work assigned them, has adopted the following:

"(1) Since one of the declared objects of the Society is 'the advancement of engineering knowledge and practice', it is recommended that at the beginning of each calendar year a budget be prepared and adopted by the Board of Direction covering the various classes of expenditures, including a fund for research or Special Committee work, of such amount as in the opinion of the Board can properly be diverted to such purposes.

"(2) That when a Special Committee is appointed it shall at once submit to the Board of Direction a project outlining the scope and character of the work proposed, together with an estimate of the cost thereof.

"(3) On the receipt of such project covering the nature of the work proposed and the estimated cost thereof, the Board of Direction may alter or amend such project and define the general lines along which the work should be conducted.

"(4) When a project has been approved by the Board of Direction the said Board may allot from the surplus funds of the Society such amount as in its opinion may be necessary and proper for the work proposed.

"(5) Any part of the allotment made for the use of a Special Committee may be used for the payment of personal expenses to the extent of mileage at a rate of three cents per mile, when transportation is actually paid by members of the Committee.

"(6) Satisfactory vouchers covering the expenditures in detail must be submitted to the Board, and must be approved by the Committee on Finance before being paid; provided, however, that the Board of Direction may advance to such Committees such sums as may, in its opinion, be deemed necessary, subject, however, to such final settlement and approval as herein provided.

"(7) It is further recommended that funds from the allotments made by the Board be subject to draft by the Chairmen of the respective Committees, from time to time, as needed, when accompanied by a statement satisfactory to the Board of Direction as to the proposed application of the funds called for."

Ballots for membership were canvassed, resulting in the election of 5 Members, 35 Associate Members, 14 Juniors, and the transfer of 9 Juniors to the grade of Associate Member.

Eight Associate Members were transferred to the grade of Member.

Applications were considered, and other routine business transacted.

Adjourned.

ANNOUNCEMENTS

The House of the Society is open from 9 A. M. to 10 P. M., every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

FUTURE MEETINGS

May 6th, 1914.—8.30 P. M.—This will be a regular business meeting. Two papers will be presented for discussion as follows: "The Determination of Safe Yield of Underground Reservoirs of the Closed-Basin Type", by Charles H. Lee, Assoc. M. Am. Soc. C. E.; and "Cinder Concrete Floors", by Guy B. Waite, M. Am. Soc. C. E.

These papers are printed in this number of *Proceedings*.

May 20th, 1914.—8.30 P. M.—At this meeting, three papers will be presented for discussion as follows: "California Practice in Highway Construction", by W. C. Hammatt, M. Am. Soc. C. E.; "Reinforced Concrete Docks: Foreign and American Structures. Failures, Costs, and General Considerations", by Harrison S. Taft, Esq.; and "Huacal Dam, Sonora, Mexico", by H. Hawgood, M. Am. Soc. C. E.

These papers are printed in this number of *Proceedings*.

ANNUAL CONVENTION

The Forty-sixth Annual Convention of the Society will be held at Baltimore, Md., from June 2d to 5th, 1914, inclusive.

Arrangements are in charge of Special Committees, and the programme will be issued very soon in a circular to the membership. Although the details cannot now be given, it is expected that, in addition to the Business and Professional Meetings, there will be all-day Excursions to Annapolis and to Sparrows Point, also to engineering works in the vicinity of Baltimore, as well as a Golf Tournament at the Country Club, and a Reception and Dance, to be given by the Engineers' Culb of Baltimore.

SEARCHES IN THE LIBRARY

In January, 1902, the Secretary was authorized to make searches in the Library, upon request, and to charge therefor the actual cost to the Society for the extra work required. Since that time many searches have been made, and bibliographies and other information on special subjects furnished.

The resulting satisfaction, to the members who have made use of the resources of the Society in this manner, has been expressed frequently, and leaves little doubt that if it were generally known to the membership that such work would be undertaken, many would avail themselves of it.

The cost is trifling compared with the value of the time of an engineer who looks up such matters himself, and the work can be performed quite as well, and much more quickly, by persons familiar with the Library.

In asking that such work be undertaken, members should specify clearly the subject to be covered, and whether references to general books only are desired, or whether a complete bibliography, involving search through periodical literature, is desired.

In reference to this work, the Appendices* to the Annual Reports of the Board of Direction for the years ending December 31st, 1906, and December 31st, 1910, contain summaries of all searches made to date.

PAPERS AND DISCUSSIONS

Members and others who take part in the oral discussions of the papers presented are urged to revise their remarks promptly. Written communications from those who cannot attend the meetings should be sent in at the earliest possible date after the issue of a paper in *Proceedings*.

All papers accepted by the Publication Committee are classified by the Committee with respect to their availability for discussion at meetings.

Papers which, from their general nature, appear to be of a character suitable for oral discussion, will be published as heretofore in *Proceedings*, and set down for presentation to a future meeting of the Society, and on these, oral discussions, as well as written communications, will be solicited.

All papers which do not come under this heading, that is to say, those which from their mathematical or technical nature, in the opinion of the Committee are not adapted to oral discussion, will not be scheduled for presentation to any meeting. Such papers will be published in *Proceedings* in the same manner as those which are to be presented at meetings, but written discussions only will be requested for subsequent publication in *Proceedings* and with the paper in the volumes of *Transactions*.

The Board of Direction has adopted rules for the preparation and presentation of papers, which will be found on page 429 of the August, 1913, *Proceedings*.

LOCAL ASSOCIATIONS OF MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

San Francisco Association

The San Francisco Association of Members of the American Society of Civil Engineers holds regular bi-monthly meetings, with banquet,

* *Proceedings*, Vol. XXXIII, p. 20 (January, 1907); Vol. XXXVII, p. 28 (January, 1911).

and weekly informal luncheons. The former are held at 6 P. M., at the Palace Hotel, on the third Friday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 P. M. every Wednesday, and the place of meeting may be ascertained by communicating with the Secretary of the Association, E. T. Thurston, Jr., M. Am. Soc. C. E., 713 Mechanics' Institute, 57 Post Street.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in San Francisco, and any such member will be gladly welcomed as a guest.

Colorado Association

The meetings of the Colorado Association of Members of the American Society of Civil Engineers are held on the second Saturday of each month, except July and August. The hour and place of meeting are not fixed, but this information will be furnished on application to the Secretary, Roger W. Toll, Assoc. M. Am. Soc. C. E., 700 Tramway Building, Denver, Colo. The meetings are usually preceded by an informal dinner. Members of the American Society of Civil Engineers will be welcomed at these meetings.

Weekly luncheons are held on Wednesdays, at 12.30 P. M., and, until further notice, will take place at the lunch room of the Denver Dry Goods Company.

Visiting members are urged to attend the meetings and luncheons.

(Abstract of Minutes of Meeting)

March 14th, 1914.—The meeting was called to order; President Ridgway in the chair; Roger W. Toll, Secretary; and present, also, 30 members and guests, including ladies.

The minutes of the meeting of February 14th, 1914, were read and approved.

A paper on "The Building and Shop Erection of the Sluice and Penstock Gates for the Elephant Butte Dam in New Mexico", was presented by L. R. Hinman, Assoc. M. Am. Soc. C. E., who illustrated his remarks with stereopticon views and with motion pictures taken at the Dam. The subject was discussed by Messrs. George F. Roehrig, Jr., and H. S. Crocker.

A vote of thanks was tendered Mr. Hinman for his interesting paper.

Adjourned.

Atlanta Association

The Atlanta Association of Members of the American Society of Civil Engineers was organized on March 14th, 1912. The Association holds its meetings at the University Club.

At the meeting of the Association on December 29th, 1913, the new Chairman, John Ruddle, M. Am. Soc. C. E., was installed, and Messrs. Park A. Dallis and G. R. Solomon were appointed members of the Executive Committee. T. P. Branch, Assoc. M. Am. Soc. C. E., was elected Secretary.

Philadelphia Association

On December 22d, 1913, the Philadelphia Association of Members of the American Society of Civil Engineers was organized with the following officers: George S. Webster, President; Richard L. Humphrey and F. Herbert Snow, Vice-Presidents; John Sterling Deans, J. W. Ledoux, Edgar Marburg, and H. S. Smith, Directors; S. M. Swaab, Treasurer; and W. L. Stevenson, Secretary. The meetings of the Association will be held at the Engineers' Club of Philadelphia, 1317 Spruce Street.

Portland, Ore., Association

On June 18th, 1913, the Portland, Ore., Association of Members of the American Society of Civil Engineers was organized with the following officers: E. G. Hopson, President; W. S. Turner, First Vice-President; D. D. Clarke, Second Vice-President; G. B. Hegardt, Treasurer; and Charles J. McGonigle, Secretary.

(Abstract of Minutes of Meeting)

February 28th, 1914.—The meeting was called to order; President Hopson in the chair; Charles J. McGonigle, Secretary; and present, also, 17 members and guests.

The minutes of the preceding meeting were read and approved.

Communications from the Executive Secretary of the International Engineering Congress, 1915, and from the San Francisco Association of Members of the American Society of Civil Engineers, were read.

W. H. Daly, Commissioner of Public Utilities, and D. D. Clarke, M. Am. Soc. C. E., Engineer of the Water Board, addressed the meeting in support of the installation of water meters in the City of Portland, and the subject was discussed by Messrs. Hopson, Graves, Henny, Taylor, Stubblefield, and Randlett.

A motion was adopted unanimously endorsing the position taken by Commissioner Daly in the matter of the installation of meters.

A vote of thanks was tendered Messrs. Daly and Clarke by the Association.

Adjourned.

Seattle Association

At the Annual Meeting of the Association, held on January 26th, 1914, the following officers were elected for the ensuing year: Ernest B. Hussey, President; A. H. Fuller, Vice-President; and Carl H. Reeves, Secretary-Treasurer.

Southern California Association

On January 5th, 1914, the Southern California Association of Members of the American Society of Civil Engineers held its first meeting at the University Club, Los Angeles, Cal., and elected the following officers: J. B. Lippincott, President; Charles T. Leeds, First Vice-President; George S. Binckley, Second Vice-President; W. K. Barnard, Secretary; and Charles H. Lee, Treasurer.

Spokane Association

At its meeting of March 4th, 1914, the Board of Direction considered and approved the proposed Constitution of the Spokane Association of Members of the American Society of Civil Engineers.

The following officers have been elected: President, C. S. MacCalla; Vice-President, U. B. Hough; Second Vice-President, Morton Macartney; Secretary-Treasurer, A. D. Butler.

Texas Association

At its meeting of December 31st, 1913, the Board of Direction considered and approved the proposed Constitution of the Texas Association of Members of the American Society of Civil Engineers.

**PRIVILEGES OF ENGINEERING SOCIETIES
EXTENDED TO MEMBERS OF THE
AMERICAN SOCIETY OF CIVIL ENGINEERS**

Members of the American Society of Civil Engineers will be welcomed by the following Engineering Societies, both to the use of their Reading Rooms, and at all meetings:

American Institute of Mining Engineers, 29 West Thirty-ninth Street, New York City.

American Society of Mechanical Engineers, 29 West Thirty-ninth Street, New York City.

Architekten-Verein zu Berlin, Wilhelmstrasse 92, Berlin W. 66, Germany.

Associação dos Engenheiros Cíveis Portuguezes, Lisbon, Portugal.

Australasian Institute of Mining Engineers, Melbourne, Victoria, Australia.

Boston Society of Civil Engineers, 715 Tremont Temple, Boston, Mass.

Brooklyn Engineers' Club, 117 Remsen Street, Brooklyn, N. Y.

Canadian Society of Civil Engineers, 413 Dorchester Street, West, Montreal, Que., Canada.

Civil Engineers' Society of St. Paul, St. Paul, Minn.

Cleveland Engineering Society, Chamber of Commerce Building, Cleveland, Ohio.

Cleveland Institute of Engineers, Middlesbrough, England.

Dansk Ingeniørforening, Amaliegade 38, Copenhagen, Denmark.

Engineers and Architects Club of Louisville, 1412 Starks Building, Louisville, Ky.

Engineers' Club of Baltimore, Baltimore, Md.

Engineers' Club of Minneapolis, 17 South Sixth Street, Minneapolis, Minn.

Engineers' Club of Philadelphia, 1317 Spruce Street, Philadelphia, Pa.

Engineers' Club of St. Louis, 3817 Olive Street, St. Louis, Mo.

Engineers' Club of Toronto, 96 King Street, West, Toronto, Ont., Canada.

Engineers' Society of Northeastern Pennsylvania, 415 Washington Avenue, Scranton, Pa.

Engineers' Society of Pennsylvania, 31 South Front Street, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania, 2511 Oliver Building, Pittsburgh, Pa.

Institute of Marine Engineers, 58 Romford Road, Stratford, London, E., England.

Institution of Engineers of the River Plate, Calle 25 de Mayo 195, Buenos Aires, Argentine Republic.

Institution of Naval Architects, 5 Adelphi Terrace, London, W. C., England.

Junior Institution of Engineers, 39 Victoria Street, Westminster, S. W., London, England.

Koninklijk Instituut van Ingenieurs, The Hague, The Netherlands.

Louisiana Engineering Society, Room 6, City Bank and Trust Company Building, New Orleans, La.

Memphis Engineering Society, Memphis, Tenn.

Midland Institute of Mining, Civil and Mechanical Engineers, Sheffield, England.

Montana Society of Engineers, Butte, Mont.

North of England Institute of Mining and Mechanical Engineers, Newcastle-upon-Tyne, England.

Oesterreichischer Ingenieur- und Architekten-Verein, Eschenbachgasse 9, Vienna, Austria.

Pacific Northwest Society of Engineers, 803 Central Building, Seattle, Wash.

Rochester Engineering Society, Rochester, N. Y.

Sachsischer Ingenieur- und Architekten-Verein, Dresden, Germany.

Sociedad Colombiana de Ingenieros, Bogota, Colombia.

Sociedad de Ingenieros del Peru, Lima, Peru.

Societe des Ingenieurs Civils de France, 19 rue Blanche, Paris, France.

Society of Engineers, 17 Victoria Street, Westminster, S. W., London, England.

Svenska Teknologforeningen, Brunkebergstorg 18, Stockholm, Sweden.

Tekniske Forening, Vestre Boulevard 18-1, Copenhagen, Denmark.

Western Society of Engineers, 1737 Monadnock Block, Chicago, Ill.

ACCESSIONS TO THE LIBRARY

(From March 3d to April 1st, 1914)

DONATIONS*

INDUSTRIAL CHEMISTRY FOR ENGINEERING STUDENTS.

By Henry K. Benson. Cloth, 7½ x 5 in., illus., 14 + 431 pp. New York, The Macmillan Company, 1913. \$1.90.

The author's aim in this book, it is stated, has been to describe from the chemical standpoint, the more common materials used in engineering, particular emphasis being laid on the occurrence, methods of manufacture, the properties, and, to a limited extent, the uses of such materials. The subject-matter has been compiled and elaborated, it is said, from lecture notes used by the author during the last eight years in a course of industrial chemistry for second-year engineering students, and each chapter has been made sufficiently complete in itself so that the various topics may be taken up and studied in any order preferred by the teacher. The author presupposes a knowledge of elementary physics and general chemistry on the part of the reader, and it is hoped that the book will give the student a working knowledge of the chemistry of materials and processes with which he will have to deal as well as the ability to interpret chemical analyses and to apply them in the preparation of specifications and in experimental research work. Such topics as fuels and combustion, clay products and cement, which are of the greatest interest and importance to engineers, are discussed quite fully, it is stated, and bibliographies of the subject discussed are given at the end of each chapter. These bibliographies have been carefully compiled and brought up to date, the arrangement being alphabetical by authors in chronological order, and it is hoped that they will be helpful to practising chemists and engineers, as well as to students. The Contents are: General Processes and Apparatus; The Atmosphere; Industrial Water; Combustion and Destructive Distillation; Solid Fuels; Liquid and Gaseous Fuels; Petroleum and Lubricating Oils; The Manufacture of Pig Iron; Commercial Forms of Iron and Steel; The Industrial Alloys; Clay Products; Hydraulic Cements and Lime Products; Paving Materials and Wood Preservation; Paint and Varnish Materials; Plastics for Electrical Insulation; Cellulose Products; Explosive Materials; Index.

THE BUREAU OF SUPPLIES

Of the Department of Water Supply, Gas and Electricity, New York City: A Report to Hon. Henry S. Thompson, Commissioner. By Elihu Cunyngnam Church, Secretary of the Department and Chief of the Bureau of Supplies. Cloth, 10½ x 7 in., illus., 93 pp. New York, M. B. Brown Printing & Binding Co., 1913. (Donated by the Author.)

In his letter of transmittal, the author states that more than two years ago, he was directed to take charge of the Bureau of Supplies of the Department of Water Supply, Gas and Electricity of New York City, to re-organize it along scientific lines, and to carry on its work in a business-like way. This has been done, it is said, and this Report shows what the conditions were before the re-organization and the results accomplished thereby. The Bureau, which was demoralized and inefficient, is to-day, it is stated, a model of its kind in its functional organization, its methods have been standardized, and its employees so instructed and trained as to make its present operation well-nigh automatic. An endeavor has been made to formulate clearly the fundamental principles involved in this work of re-organization and to present them so that this Report may serve as a textbook and guide to other officials, either in public service or in private business, who may be called on to undertake a similar task. The Chapter headings are: Plan and Scope; Organization and Administration; Purchasing; Inspection; Storage and Issue; Records and Accounts.

Gifts have also been received from the following:

Alabama-Geol. Survey. 1 pam.	Am. Wood Preservers' Assoc. 1 bound vol., 1 pam.
Alabama-State Dept. of Archives and History. 1 bound vol.	Arizona-State Board of Equalization. 1 pam.
Alabama-State Highway Dept. 1 pam.	Attleborough, Mass.-Town Clerk. 1 vol.
Am. Soc. of Mech. Engrs. 1 bound vol.	Attleborough, Mass.-Water Dept. 1 pam.
Am. Telephone & Telegraph Co. 1 bound vol., 2 pam.	Auburn, N. Y.-Water Board. 1 pam.

* Unless otherwise specified, books in this list have been donated by the publishers.

- Baltimore County, Md.-Roads Engr. 1
 pam.
 Bengal, India-Irrig. Dept. 1 pam.
 Binghamton, N. Y.-Water Comms. 1 pam.
 British Columbia-Dept. of Lands. 1 vol.
 Brookline, Mass.-Water Dept. 1 pam.
 Brown, Rome G. 1 pam.
 Burlington, Vt.-Mayor. 1 bound vol.
 Burlington, Vt.-Water Dept. 1 pam.
 California-Board of State Harbor
 Comms. 2 pam.
 California-Secy. of State. 1 pam.
 Cambrian Rys. Co. 1 pam.
 Canada-Dept. of Mines. 13 vol., 2 pam.
 Canada-Dept. of Railways and Canals.
 1 vol., 3 pam.
 Chosen-Director of the Railway Bureau.
 1 pam.
 Cleveland, Ohio-City Clerk. 1 bound
 vol.
 Clinton, Mass.-Water Dept. 2 pam.
 Colorado-Agri. Exper. Station. 3 pam.
 Dartmouth Coll.-Thayer School of Eng.
 2 pam.
 Derby, England-Borough Development
 Comm. 2 pam.
 Dover, N. H.-Board of Water Comms.
 1 pam.
 Durham, H. W. 1 vol.
Electrician, The. 1 bound vol.
 Essex County, Mass.-County Engr. 1 pam.
 Florida-State Geol. Survey. 1 vol.
 Great Central Ry. Co. 1 pam.
 Great Western Ry. Co. 1 pam.
 Green Bay & Western R. R. Co. 2 pam.
 Grosvenor, A. W. 1 pam.
 Hinds, Noble & Eldredge. 1 bound vol.
 Humphreys, Benjamin G. 1 bound vol.
 Illinois-Dept. of Factory Inspection. 2
 pam.
 Illinois-State Geol. Survey. 1 bound
 vol., 1 map.
 Illinois Miners' and Mechanics' Institutes.
 1 pam.
 Illinois Univ. of. 1 pam.
 Indiana Univ. 1 vol.
 Iowa-Geol. Survey. 1 bound vol., 1 pam.
 Iowa-R. R. Comm. 1 bound vol.
 Kansas-Insp. of Coal Mines. 1 pam.
 Kansas-Public Utilities Comm. 1 vol., 1
 pam.
 Kansas, Univ. of. 2 pam.
 Koehring Machine Co. 1 pam.
 Laargaard, Olaf. 1 pam.
 Lehigh Coal & Navigation Co. 1 pam.
 Lilly, W. E. 1 pam.
 Liverpool, England-Town Clerk. 1 bound
 vol.
 London & North Western Ry. Co. 1 pam.
 Los Angeles, Cal.-City Auditor. 1 bound
 vol.
 Louisiana-R. R. Comm. 1 map.
 McLean, Joseph P. 4 bound vol., 7
 pam.
 Madras, India-Public Works Dept. 1 pam.
 Maine-R. R. Comm. 1 bound vol.
 Maine-State Treasurer. 1 bound vol.
 Massachusetts-Harbor and Land Comms.
 1 vol.
 Mellon Institute of Industrial Research
 and School of Specific Industries. 1
 pam.
 Michigan-Geol. and Biological Survey. 1
 bound vol., 3 vol.
 Midland Ry. Co. 1 pam.
 Minneapolis, Minn.-Public Library. 1
 bound vol.
- Minnesota-State Board of Control. 1
 pam.
 Mississippi, Univ. of. 1 pam.
 Missouri-Public Service Comm. 2 pam.
 Missouri-Secy. of State. 2 pam.
 Mobile, Ala.-Board of Comms. 1 pam.
 Montana-Board of R. R. Comms. 1
 bound vol.
 Municipal Engrs. of the City of New
 York. 1 pam.
 National Fire Protection Assoc. 4 pam.
 Nebraska-State Ry. Comm. 1 vol.
 Nevada-Insp. of Mines. 2 pam.
 Nevada-Public Service Comm. 2 pam.
 New Jersey-Public Library Comm. 1
 pam.
 New South Wales-Met. Board of Water
 Supply and Sewerage. 1 bound
 vol.
 New York City-Dept. of Health. 4 pam.
 New York City-Dept. of Highways. 3
 pam.
 New York State-Dept. of Health. 1 bound
 vol.
 New York State-Metropolitan Sewerage
 Comm. 7 pam.
 New York State-Public Service Comm.,
 First Dist. 1 pam.
 New York State-Supt. of Public Works.
 3 bound vol., 1 vol.
 New York City Record. 1 bound vol.
 New York State Charities Aid Assoc. 1
 pam.
 New York Univ. 1 bound vol., 1 pam.
 Newark, N. J.-City Plan Comm. 1 bound
 vol.
 Newcastle & Gateshead Water Co. 2 pam.
 Newcastle-upon-Tyne, England-City Engr.
 1 pam.
 Norske Ingeniørforening. 1 pam.
 North British Ry. Co. 1 pam.
 North Dakota-R. R. Comms. 1 pam.
 North-East Coast Institution of Engrs.
 and Shipbuilders. 1 bound vol.
 Northampton, Mass.-Water Comms. 1
 pam.
 Ohio-Public Utilities Comm. 1 pam.
 Oklahoma-Corporation Comm. 1 bound
 vol., 1 map.
 Oklahoma Soc. of Engrs. 3 pam.
 Oregon-Bureau of Mines and Geol. 2
 pam.
 Oregon-R. R. Comm. 1 vol.
 Oregon-State Board of Forestry. 1 pam.
 Oregon-State Water Board. 1 pam.
 Oregon Soc. of Engrs. 1 pam.
 Pennsylvania R. R. Co. 1 pam.
 Permanent International Assoc. of Navi-
 gation Congresses. 1 vol.
 Philippine Islands-Bureau of Science. 1
 pam.
 Pittsburgh, Pa.-Carnegie Library. 1 pam.
 Porto Rico-Dirección de Sanidad. 1 pam.
 Providence, R. I.-City Engr. 1 pam.
 Reading, Mass.-Water Comms. 1 pam.
 Referendex Co., Limited. 1 bound vol.
 Rhode Island-State Board of Health. 1
 bound vol.
 Royal Philosophical Soc. of Glasgow. 1
 vol.
 R. Scuola d'Applicazione per gli Ingeg-
 neri in Roma. 1 pam.
 Sacramento, Cal.-City Clerk. 1 pam.
 Saint Pancras (London), England-Town
 Clerk. 1 bound vol.
 San Francisco Chamber of Commerce. 1
 pam.

- Sandoval, Aurelio. 1 pam.
 Schliffbautechnischen Gesellschaft. 1 bound vol.
 Smithsonian Institution. 1 vol., 5 pam.
 Soc. of Naval Archts. and Marine Engrs. 2 pam.
 South Australia-Dept. of Public Works. 1 vol.
 Southend Water-Works Co. 1 pam.
 Stiles, Arthur A. 1 pam.
 Sturtevant, B. F., Co. 1 bound vol.
 Switzerland-Landeshydrographie. 3 pam.
 Taunton, Mass.-Water Commrs. 1 pam.
 Texas, Univ. of. 2 pam.
 Titanium Alloy Mfg. Co. 3 pam.
 Tyrrell, Henry Grattan. 1 bound vol.
 U. S.-Bureau of Mines. 1 vol., 4 pam.
 U. S.-Bureau of Standards. 6 pam.
 U. S.-Bureau of the Census. 2 bound vol.
 U. S.-Coast and Geodetic Survey. 2 bound vol.
 U. S.-National Museum. 1 pam.
 U. S.-Ordnance Dept. 1 bound vol.
 U. S.-Reclamation Service. 2 pam.
 U. S.-Secy. of the Interior. 1 pam., 1 map.
 U. S. Steel Corporation. 1 pam.
 Vermont-Public Service Comm. 1 map.
 Washington-Public Service Comm. 1 vol.
 West Virginia-Geol. Survey. 1 bound vol., 1 map.
 Western Univ. 1 pam.
 Wisconsin-R. R. Comm. 1 map.
 Worcester, England-City Engr. 1 pam.
 Wyer, Samuel. 1 pam.
 Wyoming Univ.-Agri. Exper. Station. 1 pam.
 Yale Univ. 1 vol.

BY PURCHASE

Mechanische Grundlagen des Flugzeugbaues. Von A. Baumann. 2 Vol. R. Oldenbourg, München und Berlin, 1913.

The Panama Canal. By Frederic J. Haskin. Doubleday, Page & Company, Garden City, N. Y., 1913.

The Bulletin of the General Contractors Association, Vol. 2, 1911. The General Contractors Association, New York.

Interstate Commerce Commission Reports ; Vol. 22-23: Decisions of the Interstate Commerce Commission of the United States, Nov., 1911, to June, 1912. Government Printing Office, Washington, 1912.

The Electric Furnace: Its Construction, Operation, and Uses. By Alfred Stansfield. Second Edition, Revised and Enlarged. McGraw-Hill Book Company, Inc., New York and London, 1914.

Welding ; Theory, Practice, Apparatus, and Tests, Electric, Thermit and Hot-Flame Processes. By Richard N. Hart. Second Edition, Revised and Enlarged. McGraw-Hill Book Company, Inc., New York and London, 1914.

Ventilation and Humidity in Textile Mills and Factories. By Cecil H. Lander. Longmans, Green and Co., New York and London, 1914.

The Copper Handbook: A Manual of the Copper Mining Industry of the World. By Walter Harvey Weed. Vol. XI, 1912-13. Walter Harvey Weed, Houghton, Mich., 1914.

Mitteilungen über Forschungsarbeiten auf dem Gebiete des Ingenieurwesens. Herausgegeben vom Verein deutscher Ingenieure. Heft 146. Julius Springer, Berlin, 1914.

SUMMARY OF ACCESSIONS

(From March 3d to April 1st, 1914)

Donations (including 18 duplicates).....	249
By purchase.....	11
Total	260

MEMBERSHIP

ADDITIONS

(From March 6th to April 2d, 1914)

MEMBERS		Date of Membership.	
BALL, LAURENCE ADAMS. Cons. Engr., 19 East 24th St., New York City.....	Jun.	May	3, 1904
	Assoc. M.	Feb.	6, 1907
	M.	Mar.	4, 1914
BRIGGS, JOSIAH ACKERMAN, JR. Cons. Engr., Room 228, Laughlin Bldg., Los Angeles, Cal.....		Feb.	4, 1914
HALL, FREDERIC FRANCIS. 25 Hillside Court, Berkeley, Cal.		Dec.	31, 1913
JOACHIMSON, MARTIN. Cons. Engr., 518 West 156th St., New York City.....		Mar.	4, 1914
KERRY, JOHN GEORGE GALE. Pres., Kerry & Chace, Ltd., Confederation Life Bldg., Toronto, Ont., Canada....		Mar.	4, 1914
KON, RAY EMERSON. Hydr. and San. Engr., 875 East Yamhill St., Portland, Ore..	Assoc. M.	Oct.	7, 1908
	M.	Mar.	4, 1914
MILLIGAN, ROBERT EDGAR. Gen. Mgr., The New York Continental Jewell Filtration Co., 15 Broad St. (Res., 1 West 64th St.), New York City.....		Mar.	4, 1914
POPE, JAMES BOND. Asst. Engr., S. P. Co., 1043 Flood Bldg., San Francisco, Cal.....		Feb.	4, 1914
SMITH, CHESTER ALEXANDER. Chf. Engr., Burns & McDonnell, 823 Scarritt Bldg., Kansas City, Mo.....	Assoc. M.	April	5, 1910
	M.	Mar.	4, 1914
SPENCER, THEODORE NELSON. Asst. Engr., Dept. of City Transit, Room 744, City Hall (Res., 4903 Cedar Ave.), Philadelphia, Pa.....	Assoc. M.	Sept.	5, 1900
	M.	Mar.	4, 1914
STILES, ARTHUR ALVORD. State Reclamation Engr., Capitol Station, Austin, Tex.....		Mar.	4, 1914
SULLIVAN, JOHN FRANCIS. Prin. Asst. Engr., Bureau of Highways, Borough of Manhattan, 241 West 108th St., New York City.....	Assoc. M.	Jan.	4, 1910
	M.	Feb.	4, 1914
WELTY, HARRY TRUE. Engr. of Structures, N. Y. C. & H. R. R. R., 540 Lexington Ave., New York City....		Mar.	4, 1914
ASSOCIATE MEMBERS			
ALBERT, FREDERICK WILHELM. Asst. Engr., Water Dept., 310 District Bldg. (Res., 1727 Kilbourne Pl., N. W.), Washington, D. C.....		Mar.	4, 1914
ALBRIGHT, PORTER HUGH. Cons. Engr., 334 Consolidated Realty Bldg., Los Angeles, Cal.....		Dec.	3, 1913
ARMSTRONG, GEORGE SIMPSON. Care, Miller, Franklin & Co., Everett Chambers, Oak St., Portland, Me.....	Jun.	Jan.	5, 1909
	Assoc. M.	Mar.	4, 1914

ASSOCIATE MEMBERS (Continued)

		Date of Membership.
BAKER, JOHN JOSEPH. Res. Engr., Johnstown Water Co., Box 196, Johnstown, Pa.		Mar. 4, 1914
BARBER, EARL HUNTINGTON. Special Asst. to Attorney-General, Commonwealth of Massachusetts, 15 Ashburton Pl., Boston, Mass.		Mar. 4, 1914
BEAN, PAUL JONES. Civ. Engr., U. S. N., Naval Station, Pearl Harbor, Honolulu, Hawaii.	Jun. May 2, 1911 Assoc. M. Dec. 31, 1913	
CARLISLE, ORVILLE BERTON. Designer, Steel Structures, Am. Bridge Co. (Res., 4240 Calumet Ave.), Chicago, Ill.	Jun. Sept. 4, 1906 Assoc. M. Mar. 4, 1914	
CONKLING, HAROLD. Asst. Engr., U. S. Reclamation Service, Boise, Idaho.		Nov. 12, 1913
EVERS, WILLIAM HENRY. Pres., The Wm. H. Evers Eng. Co.; Pres., The Concrete Flooring Co., 332 The Arcade, Cleveland, Ohio.		Mar. 4, 1914
GRAY, ROY CECIL. 502 Orear-Leslie Bldg., Kansas City, Mo.	Jun. Oct. 3, 1911 Assoc. M. Mar. 4, 1914	
GRÖNER, TRYGVE DANIEL BODTKER. Asst. Engr., Ore. Short Line R. R., 606 Deseret News Bldg., Salt Lake City, Utah.		Mar. 4, 1914
HARRIS, HARRY FALLON. Asst. Engr. of Streets, 759 Stuyvesant Ave., Trenton, N. J.		Feb. 4, 1914
HARROD, TOM HIND HUDSON. Care, J. G. White Eng. Co., Parr, S. C.	Jun. Feb. 1, 1910 Assoc. M. Mar. 4, 1914	
HOOVER, ANDREW PEARSON. Engr. and Asst. to Vice-Pres., John W. Ferguson Co., 152 Market St., Paterson, N. J.		Mar. 4, 1914
HOUSTON, ROBERT HUGH. Civ. Engr. and Supt. of Constr., Office of the Quartermaster, U. S. A., Las Cascadas, Canal Zone, Panama.		Oct. 1, 1913
JONES, EDWARD HORTON. Constr. Engr., Arizona Copper Co., Box 96, Clifton, Ariz.		Mar. 4, 1914
JONES, SARGENT FELIX. Engr. and Asst. Supt., Canadian Stewart Co., Ltd., Edmonton, Alberta, Canada.		Mar. 4, 1914
KACKLEY, WALTER JOHN. Chf. Engr., The Everglades Sugar & Land Co., 1105 Avenue C, Miami, Fla.		Mar. 4, 1914
MALSBURY, OMER EVERT. Asst. Engr., Isthmian Canal Comm., Culebra, Canal Zone, Panama.	Jun. Feb. 5, 1907 Assoc. M. Feb. 4, 1914	
OSBORN, FRANK EDGAR. Contr. Engr., Indiana Bridge Co., 315 East 7th St., Muncie, Ind.		Dec. 31, 1913
OSBORN, KENNETH HOWARD. Structural Engr., Board of Education, Rockwell Ave. and East 6th St., Cleveland, Ohio.	Jun. Oct. 5, 1909 Assoc. M. Mar. 4, 1914	

ASSOCIATE MEMBERS (Continued)

		Date of Membership.
PHILLIPS, CLIFFORD FRENCH. Associated with		
Hiram Phillips, Cons. Engr., 716 International Life Bldg., St. Louis, Mo...	Jun. 1909	Nov. 30, 1909
	Assoc. M.	Mar. 4, 1914
POTTS, ROBERT JOSEPH. Prof., Highway Eng., Agricultural and Mechanical Coll. of Taxes, College Station, Tex.		Dec. 3, 1913
PRATT, WALTER MITCHELL. Mgr., States Eng. Co., 509 Free Press Bldg., Detroit, Mich.		Feb. 4, 1914
REGESETER, HENRY SLICER, JR. Asst. Engr., Sewerage Comm., Garrison-Duvall Apartments, Walbrook, Baltimore, Md.	Jun. 1909	Jan. 7, 1908
	Assoc. M.	Mar. 4, 1914
REQUARDT, GUSTAV JAEGER. Asst. Div. Engr., Baltimore Sewerage Comm., 2235 Eutaw Pl., Baltimore, Md.		Mar. 4, 1914
REYNOLDS, WILLIAM LE ROY. 1535 Clarkson St., Denver, Colo.		Feb. 4, 1914
SCHRYVER, HOWARD FRENCH. Asst. Valuation Engr., T. & O. Cent., and Zanesville & West. Rys., 1011 Outlook Bldg., Columbus, Ohio.		Mar. 4, 1914
SHOUP, STEPHEN ELLIOTT. Asst. Engr., Dept. of Sewers, 306 Odd Fellows Temple, Cincinnati, Ohio.		Mar. 4, 1914
SMALL, GILBERT. Chf. Asst. Engr., J. R. Worcester Co., 428 Lexington St., Waltham, Mass.	Jun. 1909	June 1, 1909
	Assoc. M.	Nov. 12, 1913
SULLIVAN, MAURICE JOSEPH. City Archt., No. 22 Kingstone Apartments, Houston, Tex.		Mar. 4, 1914
TAMMEN, HENRY CASPER. Chf. Designer, Waddell & Harrington, 1012 Baltimore Ave., Kansas City, Mo.		Mar. 4, 1914
VANDEMOER, NICHOLAS CORNELIUS. Box 624, Sterling, Colo.		Oct. 1, 1913
WIGLEY, CHESTER GREENHALGH. San. Engr., Board of Health of the State of New Jersey, 675 Rutherford Ave., Trenton, N. J.		Oct. 1, 1913
WULZEN, RICHARD JOHN. Care, Alaska Gastineau Min. Co., Juneau, Alaska.		Mar. 4, 1914

JUNIORS

BENDEL, JACOB. 55 East 117th St., New York City.	Mar. 4, 1914
BOWEN, WALTER COX. Asst. Engr., Clyde Potts, 78 College Ave., New Brunswick, N. J.	Dec. 31, 1913
COOPER, CLARENCE WINSTON. Box 443, Wilson, N. C.	Mar. 4, 1914
DU PRÉ, WALLACE DUNCAN. 233 North Church St., Spartanburg, S. C.	Mar. 4, 1914
ENGLISH, HENRY WILLIAM. Office Engr., C., M. & St. P. Ry., Manning, Iowa.	Nov. 12, 1913
HERSEY, THEODORE SCHUYLER. Care, Smith, Emery & Co., 651 Howard St., San Francisco, Cal.	Mar. 4, 1914
HOLDEN, WILLIAM. Res. Engr., Brenneke & Fay, 1900 Washington Ave., Fort Worth, Tex.	Mar. 4, 1914

JUNIORS (Continued)

	Date of Membership.
PAYNE, LOUIS WATTERS. Care, B. W. Payne, 3605 Fourteenth St., N. W., Washington, D. C.....	Dec. 3, 1913
PIRNIE, HERBERT MALCOLM. 112 Magnolia Terrace, Springfield, Mass.....	Feb. 4, 1914
PRIEST, HENRY MALCOLM. 1757 North Normandie Ave., Hollywood, Cal.....	Nov. 12, 1913
SOUTHER, MORTON EDWIN. 1322 Sixth St., S. E., Minneapolis, Minn.....	Feb. 4, 1914
STEWART, FRANK CLYDE. Asst. to Div. Engr., Lorain, Ashland & South. R. R., 813 Fifth St., Lorain, Ohio.	Oct. 1, 1913
WAGNER, JOHN, JR. Draftsman, Phoenix Bridge Co., 173 Second Ave., Phoenixville, Pa.....	Mar. 4, 1914
WHITMORE, CHARLES WILLIAM. Care, Lockwood, Greene & Co., 60 Federal St., Boston, Mass.....	Feb. 4, 1914
WISKOCIL, CLEMENT TEHLE. Research Asst., Hydr. Eng., Univ. of Wisconsin, Madison, Wis.....	Feb. 4, 1914
YU, LIANG. Designer of Railroad Structures, C. M. & St. P. Ry., 2621 Crystal St., Chicago, Ill.....	Dec. 31, 1913

CHANGES OF ADDRESS

MEMBERS

ADGATE, FREDERICK WHITNEY. Care, The Foundation Co., Little Hocking, Ohio.
ALDERMAN, CHARLES ALDO. Civ. and Cons. Engr. (Diehl & Alderman), 832 Granite Bldg., Rochester, N. Y.
BALDWIN, WILLIAM JAMES, JR. Cons. Engr. (Heating and Ventilating), Room 501, World Bldg., New York City.
BARNES, THOMAS HOWARD. Cons. Engr., 17 Batterly Pl., Room 1627, New York City.
BINKLEY, GEORGE HOLLAND. Chf. Engr., M. of W. and Structures, S. F. & O. Ter. Rys., 1440 Broadway, Room 308, Oakland, Cal.
BISSELL, HEZEKIAH. Box 195, Altadena, Cal.
BRODIE, ORRIN LAWRENCE. Associate Efficiency Engr., Care, Efficiency and Budget Advisory Staff, Board of Estimate and Apportionment, 51 Chambers St., New York City.
BROWN, LOUIS LIVINGSTON. Vice-Pres., The Foundation Co., 233 Broadway, New York City.
CAMERON, HARRY FRANK. Dept. Engr., Dept. of Mindanao and Sulu, Zamboanga, Philippine Islands.
CHRISTY, GEORGE LEWIS. Curry Bldg., Pittsburgh, Pa.
CHURCH, WILLIAM LEE. Cons. Engr., Ambursen Co., 61 Broadway, New York City (Res., 583 Central Ave., East Orange, N. J.).
COBURN, HOWARD LINCOLN. Secy. and Chf. Engr., Ambursen Co., 61 Broadway, New York City.

MEMBERS (Continued)

- DAVIS, CHARLES STRATTON. Care, Interstate Commerce Comm., Chattanooga, Tenn.
- DIEHR, ALVAH BENJAMIN. Surv. and Highway Engr., Vernon County, Nevada, Mo.
- ECKART, WILLIAM ROBERTS. Cons. Engr., 1445 Bryant St., Palo Alto, Cal.
- EDWARDS, WARRICK RIGELEY. Senior Structural Engr., Eastern Dist., Div. of Valuation, Interstate Commerce Comm., Washington, D. C.
- ESSELSTYN, HORACE HOVEY. Constr. Engr., The Edison Illuminating Co. (Res., 65 Pingree Ave.), Detroit, Mich.
- EWEN, JOHN MEIGGS. Cons. Engr., 501 Rookery Bldg., Chicago, Ill.
- GIDDINGS, FREDERICK. The Cherokee, Lake Charles, La.
- GOLDMARK, HENRY. 270 West 94th St., New York City.
- HESS, ALFRED ELMER. Care, Valuation Div., Interstate Commerce Comm., Washington, D. C.
- HILL, LOUIS CLARENCE. Cons. Engr., 1112 Hollingsworth Bldg., Los Angeles, Cal.
- HOBART, ALBERT CLAUDE. 57 School St., Rockland, Mass.
- HOWE, EDWARD WILLARD. Engr., Special Work, Bridge and Ferry Div., Public Works Dept., 62 City Hall, Boston, Mass.
- HUGGINS, WILLIAM. P. O. Box 111, Rio de Janeiro, Brazil.
- HUGHES, FRANCIS DEY. Contr. Mgr. and Designing Engr., Illinois Steel Bridge Co., 1311 Rialto Bldg., Kansas City, Mo.
- IRWIN, JAMES CLARK. Asst. Valuation Engr., B. & A. R. R., Room 230, South Station, Boston, Mass.
- JACOBSEN, HANS PETTER RUDE. Care, United States Realty & Impvt. Co., 168 West 23d St., New York City.
- JUDSON, WILLIAM VOORHEES. Lt.-Col., Corps of Engrs., U. S. A., U. S. Engr. Office, Federal Bldg., Chicago, Ill.
- KUTZ, CHARLES WILLAUER. Maj., Corps of Engrs., U. S. A., U. S. Engr. Office, 305 Southern Bldg., Washington, D. C.
- LEGARÉ, BALIE PEYTON. Chf. Engr., United Railroads of San Francisco, 58 Sutter St., San Francisco, Cal.
- LESTER, WILLIAM JUNIUS. 390 Central Park West, New York City.
- LINK, JOHN WILLIAM. Hydr. Engr., H. M. Byllesby & Co., 1900 Continental and Commercial Bank Bldg., Chicago, Ill.
- LIPSEY, THOMAS EUGENE LEARD. U. S. Asst. Engr., 325 Custom House, New Orleans, La.
- MALTBY, FRANK BIERCE. Care, Norton, Griffiths & Co., Ltd., St. John, N. B., Canada.
- MERRILL, OSCAR CHARLES. Chf. Engr., U. S. Dept. of Agriculture, Forest Service, Washington, D. C.
- MILLARD, CHARLES STERLING. Supt., P. & E. Div., C., C. & St. L. Ry., Murphy Bldg., Indianapolis, Ind.
- MOODY, BURDETT. 1043 San Pasqual St., Pasadena, Cal.
- PARKER, ADELBERT FRANKLIN. 318 Col. Hudson Bldg., Ogden, Utah.
- PATCH, WALTER WOODBURY. Cons. Engr., 12 Geary St., San Francisco, Cal.

MEMBERS (Continued)

- PEARSON, EDWARD JONES. First Vice-Pres., Mo. Pac. Ry., 1003 Railway Exchange Bldg., St. Louis, Mo.
- PEASE, FLOYD ODELL. 185 Montclair Ave., Montclair, N. J.
- POLHAMUS, ROYAL ALBERT. Res. Engr., Dominion Bridge Co., Ltd., 704 Canada Bldg., Winnipeg, Man., Canada.
- PROUT, HENRY GOSLEE. Pres. and Gen. Mgr., The Union Switch & Signal Co., 30 Church St., New York City.
- ROGGE, JOHN CHARLES LEWIS. Katonah, N. Y.
- SANFORD, GEORGE OTIS. Project Mgr., U. S. Reclamation Service, Powell, Wyo.
- SHEPHERD, FRANK CUMMINGS. Valuation Engr., B. & M. R. R., Boston, Mass.
- SILLIMAN, CHARLES. Room 609, Munsey Bldg., Washington, D. C.
- SMITH, WILLIAM ERNEST. 1711 West Minnehaha, St. Paul, Minn.
- SWANKER, JOHN EDWARD. R. F. D. No. 2, Berryville, Va.
- TERRY, HIRAM EVERETT. 115 Eddy St., Flint, Mich.
- THAYER, ROLAND ALDRICH. Dist. Engr., Lockwood, Greene & Co., 60 Federal St., Boston, Mass.
- THOMAS, JOHN CHARLES. Vice-Pres., National Contract Co., New Richmond, Ohio.
- TÖNNESSEN, TOBIAS. Gen. Mgr. and Engr.-in-Chf., South West Africa Co., Ltd., Grootfontein, German Southwest Africa.
- VERRILL, GEORGE ELLIOT. U. S. Asst. Engr., 708 Second National Bank Bldg., New Haven, Conn.
- YONGE, SAMUEL HUMPHREYS. 900 West Franklin St., Richmond, Va.
- ZOOK, MORRIS ALEXANDER. Care, Interstate Commerce Comm., Div. of Valuation, 1311 G St., N. W., Washington, D. C.

ASSOCIATE MEMBERS

- ADAMS, FRANK HICKS. Lockport, La.
- ARRINGTON, JOHN. Care, Commercial Exchange Corporation, Port Arthur, Ont., Canada.
- AYER, FREDERIC EUGENE. Dean, Coll. of Eng., Municipal Univ. of Akron, Akron, Ohio.
- BAKER, SHELDON KING. 610 North Second Ave., Phoenix, Ariz.
- BARLOW, JAMES EVANS. Director of Public Service, City Hall, Dayton, Ohio.
- BEATY, ROBERT ERNEST. Care, The Republic Creosoting Co., Mobile, Ala.
- BELLAMY, HERBERT ERNEST. Res. Engr., Public Works Dept., Water Supply and Sewerage Branch, Sydney, Australia.
- BIGELOW, WILLIAM WALTER. Technology Chambers, Boston, Mass.
- BROGAN, THOMAS BYRNES. 345 St. Johns Pl., Brooklyn, N. Y.
- BROOKS, JOSIAH RICHARDSON. Long Key, Fla.
- BUCK, CON MORRISON. Constr. Engr., 1436 South 31st St., Kansas City, Kans.
- BURGOYNE, JOHN HENRY, JR. Care, Peruvian Exploration Co., Llata, via Huanuco, Peru.

ASSOCIATE MEMBERS (Continued)

- CAMPBELL, DUNCAN HUGH. Care, Medeiros, Campbell & Co., Rua São José 76, Caixa Postal 208, Rio de Janeiro, Brazil.
- CLAFLIN, FRED WINSLOW. Res. Engr. and Supt. of Constr., Cambria Steel Co., 437 Park Ave., Johnstown, Pa.
- COLYER, CHARLES IRVING. Asst. Engr., Westinghouse, Church, Kerr & Co., 314 North Fullerton Ave., Montclair, N. J.
- CONNER, ARTHUR WATSON. Engr. of Grade Crossings, New York State Barge Canal Terminals, Lyon Blk., Albany, N. Y.
- COOK, HORACE ARTHUR. Cons. Highway Engr., 5 North 17th Ave., Phenix, Ariz.
- CULLEN, ROBERT EMMET. Chf. Asst. Engr., Lakeville Holding & Development Co., Queens, N. Y.
- CURRIER, ALBERT MOORE. Asst. Engr., L. S. & M. S. Ry., Cleveland, Ohio.
- CUTTING, ROBERT CURTIS. Const. Engr., Govt. of South Australia, on Impvt. of River Murray, Care, Engr.-in-Chf., South Australia, Adelaide, South Australia.
- DANDOIS, CHARLES STEPHEN. Dist. Engr., Bureau of Public Works, Manila, Philippine Islands.
- DATER, PHILIP HERRICK. City Engr., City Hall, Portland, Ore.
- DINSMORE, MATTHEW RAYMOND. Care, Doullut & Williams, Am. National Bank Bldg., Shreveport, La.
- DITTOE, WILLIAM HENRY. Chf. Engr., Ohio State Board of Health, Page Hall, Ohio State Univ., Columbus, Ohio.
- DOOLITTLE, HAROLD JAMES. Asst. Engr., State Highway Dept., Rosalia, Wash.
- DUNHAM, ROBERT MOORE. Supt., Gen. Constr. Co., 506 F. & M. Bank Bldg., Fort Worth, Tex.
- FISHER, WILBUR HOWARD. Engr. on Constr., 12th Street Trafficway, Care, Graff Constr. Co., Kansas City, Mo.
- FLOYD, EARL NESBY. Asst. Engr., Morgan Eng. Co., City National Bank Bldg., Dayton, Ohio.
- FRIESELL, FRANK McCLAREN. San Francisco, Cal.
- FRUIT, JOHN CLYDE. Care, Gaut & Chase, 759 Peoples Gas Bldg., Chicago, Ill.
- GANSER, SYLVAN EARLE. Structural Engr., Toltz Eng. Co., 1409 Pioneer Bldg., St. Paul, Minn.
- GRANT, JOSEPH ALEXANDER. Care, E. G. M. Cape & Co., Ltd., P. O. Box 30, Saint John, N. B., Canada.
- GRAVES, GEORGE AUGUSTUS. Route 5, Trenton, N. J.
- GRAY, HARRY MATT. 21 Roosevelt Ave., Chicopee, Mass.
- GREEN, THEODORE. 1010 Mutual Life Bldg., Buffalo, N. Y.
- GREENLAW, RALPH WELLER. Asst. Engr., Board of Water Supply of New York City, 2338 University Ave., New York City.
- HALDEMAN, WALTER STANLEY. Eng. Sales Mgr., The Berger Mfg. Co., 260 Monadnock Blk., Chicago, Ill.
- HAMMOND, LESTER CLARK. Care, Barclay Parsons & Klapp, 60 Wall St., New York City.

ASSOCIATE MEMBERS (Continued)

- HAUCK, WILLIAM. Room 2408, Municipal Bldg., New York City.
- HONEYMAN, BRUCE RITCHIE. Gen. Contr. (Fennell & Honeyman), 523 Northwestern Bank Bldg., Portland, Ore.
- HOWE, LYMAN STANLEY. Civ., Min. and Structural Engr. (Boyle & Howe), 401 Bennett Bldg., Wilkes-Barre, Pa.
- HUNTINGTON, LINN MURDOCK. Vice-Pres. and Gen. Mgr., Bramon Estates Co., Hacienda Bramon, Rubio, Venezuela.
- HUTCHINS, EDWARD. Care, International Paper Co., 30 Broad St., New York City.
- JOHNSTON, THOMAS STEWART. Chf. Engr., The L. E. Myers Co., San Francisco, Cal.
- KIRKPATRICK, RALPH ZENAS. Junior Engr., Care, Second Div. Engr., Isthmian Canal Comm., Culebra, Canal Zone, Panama.
- KLEIN, ROY ALTON. Res. Engr., Oregon State Highway Comm., Box 860, Portland, Ore.
- KNOUSE, HOMER VIRGIL. With Metropolitan Water Board, 2616 California St., Omaha, Nebr.
- LARMON, FRANK PERRY. Chf. Engr., Consolidated Water Co., Utica, N. Y.
- LARSEN, HENRY. Structural Engr., 523 Northwestern Bank Bldg., Portland, Ore.
- LAWRENCE, EGBERT VANHORN. Asst. Engr., Bureau of Highways, Bronx, 177th St. and Third Ave. (Res., 1718 Edison Ave.), New York City.
- LINTON, WALTER POWELL. Care, The Foundation Co., 233 Broadway, New York City.
- MACFETERS, JOHN ORR. 56 Benson St., Glen Ridge, N. J.
- MCALLISTER, DANIEL HANDLEY. Constr. Supt., Utah Power & Light Co., 642 South Eighth St., East, Salt Lake City, Utah.
- McLACHLAN, DUNCAN WILLIAM. Engr. in Chg., Hudson Bay Terminus, Port Nelson, Man., Canada.
- MAGOR, HENRY BASIL. Vice-Pres., National Steel Car Co., Ltd., Hamilton, Ont., Canada.
- MAHON, JOHN MONTGOMERY, JR. Civ. and San. Engr., Pennsylvania Dept. of Health; Editor, *Journal of the Engineers' Society of Pennsylvania*, 1403 North Front St., Harrisburg, Pa.
- METCALFE, JOSEPH DAVIS. Asst. Engr., Houston & Texas Central Ry., Pitt's Bridge, Tex.
- MILLER, HIRAM. 121 Center St., West Haven, Conn.
- MOSES, CARROLL. Asst. Engr., Public Belt R. R., City Hall, New Orleans, La.
- NEWTON, GEORGE CHENEY. Engr., Newton Eng. Co., 336 Twenty-fourth St., Milwaukee, Wis.
- NOLAND, CLARENCE J. Room 625, Pennsylvania Station, Pittsburgh, Pa.
- NORTH, ARTHUR TAPPAN. Contr. Engr., 300 Broadway, Room 1708, St. Louis, Mo.
- PAGE, ARTHUR SOUTHWICK. Dist. Engr., J. G. White Eng. Corporation, Atlantic Coast Line R. R. Appraisal, P. O. Box 933, Wilmington, N. C.
- PETERSON, OTTO WALLACE. 5726 Claremont Ave., Oakland, Cal.

ASSOCIATE MEMBERS (Continued)

- PIERCE, THOMAS DAY. Asst. Engr., T. & O. Cent. Ry., 1011 Outlook Bldg., Columbus, Ohio.
- PLOGSTED, WALTER JOHN. Engr., R. W. Cameron & Co., 24 Bond St., G. P. O. Box 540, Sydney, Australia.
- RANNELLS, CLARENCE J. Marietta, Ohio.
- RATHJENS, GEORGE WILLIAM. Supt., Twin City Brick Co., 163 West Robie St., St. Paul, Minn.
- REED, HOWARD SAWYER. Cons. Engr., Suite 215, Noll Bldg., Phenix, Ariz.
- RUSSELL, VERNEY WARREN. Asst. Engr., U. S. Reclamation Service, Fort Shaw, Mont.
- SANFORD, HARRY CHARLES. Treas. and Chf. Engr., Degnon Contr. Co., 42d Street Bldg., New York City.
- SCHULTZ, CHARLES. City Engr., McKinney, Tex.
- SKORNIAKOFF, EUGENE EUGENIEVICH. 15, B. Monetnaya, St. Petersburg, Russia.
- SMITH, CHESTER WASON. Cons. Engr., 2 Rector St., New York City.
- SOULÉ, EDWARD LEE. Cons. Engr., 916 Rialto Bldg., San Francisco, Cal.
- STANTON, WILBOR DICKENS. Cohocton, N. Y.
- STEWART, SPENCER JAMES. Div. Engr., State Highway Comm., 30 Carroll St., Poughkeepsie, N. Y.
- STOTT, SAMUEL EDWIN. Structural Engr., Swift & Co., Constr. Dept., 60 North Market St., Boston, Mass.
- THAYER, NATHANIEL AUGUSTINE. 905 Windsor Ave., Chicago, Ill.
- TREADWELL, WILLIAM ADAMS. Highway Engr., Dept. of Efficiency and Economy, Albany (Res., 5 Washington Pl., Troy), N. Y.
- TURLEY, OMNER JAY. Cons. Engr., 606 Texas St., El Paso, Tex.
- TYRE, PHILIP SCOTT. Archt. and Engr., 1509 Arch St., Philadelphia, Pa.
- VALLE ZENO, CARLOS DEL. Cons. and Contr. Engr., P. O. Box 1369, Havana, Cuba.
- WARD, WALTER. Care, U. S. Reclamation Service, Phenix, Ariz.
- WERBIN, ISRAEL VERNON. Asst. Div. Engr., Public Service Comm., First Dist., 891 Forest Ave., New York City.
- WHITSIT, LYLE ANTRIM. Care, O. C. Merrill, Chf. Engr., Forest Service, Washington, D. C.

JUNIORS

- BEALL, PENDLETON. Asst. Engr., Cambria Steel Co., P. O. Box 87, Johnstown, Pa.
- BITHER, TOM ALLEN. With City Engr., 2486 Grove St., Berkeley, Cal.
- BORNEFELD, CHARLES FOWLER. Res. Engr., Concrete Steel Eng. Co., Room 30, City Hall, Minneapolis, Minn.
- CHAPMAN, ASA B. 539 Pacific Elec. Bldg., Los Angeles, Cal.
- DALY, ALBERT PETER VINCENT. 27 Manhattan Ave., New York City.
- DAVENPORT, ROYAL WILLIAM. Asst. Engr., Water Resources Branch, U. S. Geological Survey, 421 Federal Bldg., Salt Lake City, Utah.

JUNIORS (Continued)

- DIRATZOUYAN, JANIK KEVORK. Res. Sales Engr., American Levant Agency, Manoukian Han, Galata (via London), Constantinople, Turkey.
- DONLE, EARL RAYMOND. Benjamin Rd., Belmont, Mass.
- DORRANCE, FRANK YOUNG. Prin. Asst. Engr., Filtration Works, 805 Durocher St., Montreal, Que., Canada.
- DRURY, WILLIAM FISHER. Care, Central Maine Power Co., Waterville, Me.
- FEELEY, WILLIAM PATRICK. Care, Great Lakes Dredge & Dock Co., 1100 Morgan Bldg., Buffalo, N. Y.
- HENNING, CHARLES SUMNER, JR. Idaho Falls, Idaho.
- HITT, HENRY COLLINS. Asst. State Field Engr., Olympia, Wash.
- KING, TAO. 11 Yen Chia Hong, Soochow, China.
- LEARNED, ALBERT PREISACH. Res. Engr., with Worley & Black, Cons. Engrs., 301 Reliance Bldg., Kansas City, Mo.
- LISMAN, OLIVER CROMWELL. Vice-Pres. and Gen. Mgr., Kansas City & Memphis Ry., Rogers, Ark.
- MACKRELL, EDWIN ALLEN. 971 East 18th St., Brooklyn, N. Y.
- MONROE, ROBERT ANSLEY. 1016 Eddy St., San Francisco, Cal.
- MORGAN, JOSEPH HOLLOWAY. Junior Engr., U. S. Geological Survey, 1741 F St., N. W., Washington, D. C.
- MOSE, ALBERT LEO BRECHT. 1125 Twenty-seventh St., Denver, Colo.
- MUCHEMORE, HARRIE LANGDON. Engr., W. W. Anderson & Co., 107 Grant Ave., San Francisco (Res., 2843 Green St., Berkeley), Cal.
- O'NEIL, HARRY BERNARD. Civ. Engr. and Surv., 61 Court St., Keene, N. H.
- ROWE, WILFRED LINCOLN. Meadow Creek, Wash.
- TIMBERLAKE, SETH MARTIN. Junior Engr., Public Service Comm., First Dist., 154 Nassau St., New York City (Res., 566 Park Ave., East Orange, N. J.).
- WHITMORE, HAROLD CUSHING. P. O. Box 361, Shelburne Falls, Mass.
- WILSON, CALVIN LOUGHRIDGE. 1222 South Jennings Ave., Fort Worth, Tex.
- WILSON, WILLIAM WEST. 95 Montclair Ave., Newark, N. J.
- WOLFF, ALFRED DANIEL, JR. Asst. Engr., N. Y. C. & H. R. R. R., 22 Summit Ave., White Plains, N. Y.
- YEREANCE, ALEXANDER WOODWARD. 418 Centre St., South Orange, N. J.

FELLOW

- HILL, JAMES JEROME. 291 East 3d St., St. Paul, Minn.

RESIGNATIONS

ASSOCIATE MEMBERS

	Date of Resignation.
HOWE, CLARENCE DURAND.....	Mar. 4, 1914
KOENIG, ARNOLD CHARLES VON WASMER.....	April 1, 1914

ASSOCIATE

AMBLER, DANIEL GRIFFITH.....	Mar. 4, 1914
------------------------------	--------------

DEATHS

HOLLOWAY, ROGER TIFFT. Elected Junior, May 31st, 1910; Associate Member, May 7th, 1913; died March 13th, 1914.

HUNICKE, WILLIAM AUGUST. Elected Associate Member, March 2d, 1904; Member, January 7th, 1913; died March 9th, 1914.

JENKINS, WILLIAM DUNBAR. Elected Member, September 7th, 1887; died March 12th, 1914.

MORSE, BENJAMIN FRANKLIN. Elected Member, July 12th, 1877; died February 24th, 1914.

WESTINGHOUSE, GEORGE. Elected Member, January 7th, 1891; died March 12th, 1914.

Total Membership of the Society, April 2d, 1914.

7 377.

MONTHLY LIST OF RECENT ENGINEERING ARTICLES OF INTEREST

(March 2d to April 1st, 1914)

NOTE.—This list is published for the purpose of placing before the members of this Society, the titles of current engineering articles, which can be referred to in any available engineering library, or can be procured by addressing the publication directly, the address and price being given wherever possible.

LIST OF PUBLICATIONS

In the subjoined list of articles, references are given by the number prefixed to each journal in this list:

- | | |
|--|---|
| (1) <i>Journal</i> , Assoc. Eng. Soc., St. Louis, Mo., 30c. | (28) <i>Journal</i> , New England Water-Works Assoc., Boston, Mass., \$1. |
| (2) <i>Proceedings</i> , Engrs. Club of Phila., Philadelphia, Pa. | (29) <i>Journal</i> , Royal Society of Arts, London, England, 6d. |
| (3) <i>Journal</i> , Franklin Inst., Philadelphia, Pa., 50c. | (30) <i>Annales des Travaux Publics de Belgique</i> , Brussels, Belgium, 4 fr. |
| (4) <i>Journal</i> , Western Soc. of Engrs., Chicago, Ill., 50c. | (31) <i>Annales de l'Assoc. des Ing. Sortis des Ecoles Spéciales de Gand</i> , Brussels, Belgium, 4 fr. |
| (5) <i>Transactions</i> , Can. Soc. C. E., Montreal, Que., Canada. | (32) <i>Mémoires et Compte Rendu des Travaux</i> , Soc. Ing. Civ. de France, Paris, France. |
| (6) <i>School of Mines Quarterly</i> , Columbia Univ., New York City, 50c. | (33) <i>Le Génie Civil</i> , Paris, France, 1 fr. |
| (7) <i>Gesundheits Ingenieur</i> , München, Germany. | (34) <i>Portefeuille Economiques des Machines</i> , Paris, France. |
| (8) <i>Stevens Institute Indicator</i> , Hoboken, N. J., 50c. | (35) <i>Nouvelles Annales de la Construction</i> , Paris, France. |
| (9) <i>Engineering Magazine</i> , New York City, 25c. | (36) <i>Cornell Civil Engineer</i> , Ithaca, N. Y. |
| (10) <i>Cassier's Magazine</i> , New York City, 25c. | (37) <i>Revue de Mécanique</i> , Paris, France. |
| (11) <i>Engineering</i> (London), W. H. Wiley, New York City, 25c. | (38) <i>Revue Générale des Chemins de Fer et des Tramways</i> , Paris, France. |
| (12) <i>The Engineer</i> (London), International News Co., New York City, 35c. | (39) <i>Technisches Gemeindeblatt</i> , Berlin, Germany, 0. 70m. |
| (13) <i>Engineering News</i> , New York City, 15c. | (40) <i>Zentralblatt der Bauverwaltung</i> , Berlin, Germany, 60 pf. |
| (14) <i>Engineering Record</i> , New York City, 10c. | (41) <i>Electrotechnische Zeitschrift</i> , Berlin, Germany. |
| (15) <i>Railway Age Gazette</i> , New York City, 15c. | (42) <i>Proceedings</i> , Am. Inst. Elec. Engrs., New York City, \$1. |
| (16) <i>Engineering and Mining Journal</i> , New York City, 15c. | (43) <i>Annales des Ponts et Chaussées</i> , Paris, France. |
| (17) <i>Electric Railway Journal</i> , New York City, 10c. | (44) <i>Journal</i> , Military Service Institution, Governors Island, New York Harbor, 50c. |
| (18) <i>Railway Review</i> , Chicago, Ill., 15c. | (45) <i>Colliery Engineer</i> , Scranton, Pa., 25c. |
| (19) <i>Scientific American Supplement</i> , New York City, 10c. | (46) <i>Scientific American</i> , New York City, 15c. |
| (20) <i>Iron Age</i> , New York City, 20c. | (47) <i>Mechanical Engineer</i> , Manchester, England, 3d. |
| (21) <i>Railway Engineer</i> , London, England, 1s. 2d. | (48) <i>Zeitschrift</i> , Verein Deutscher Ingenieure, Berlin, Germany, 1. 60m. |
| (22) <i>Iron and Coal Trades Review</i> , London, England, 6d. | (49) <i>Zeitschrift für Bauwesen</i> , Berlin, Germany. |
| (23) <i>Railway Gazette</i> , London, England, 6d. | (50) <i>Stahl und Eisen</i> , Düsseldorf, Germany. |
| (24) <i>American Gas Light Journal</i> , New York City, 10c. | (51) <i>Deutsche Bauzeitung</i> , Berlin, Germany. |
| (25) <i>Railway Age Gazette</i> , Mechanical Edition, New York City, 20c. | (52) <i>Rigaskie Industrie-Zeitung</i> , Riga, Russia, 25 kop. |
| (26) <i>Electrical Review</i> , London, England, 4d. | (53) <i>Zeitschrift</i> , Oesterreichischer Ingenieur und Architekten Vereines, Vienna, Austria, 70h. |
| (27) <i>Electrical World</i> , New York City, 10c. | |

- (54) *Transactions, Am. Soc. C. E.*, New York City, \$12.
 (55) *Transactions, Am. Soc. M. E.*, New York City, \$10.
 (56) *Transactions, Am. Inst. Min. Engrs.*, New York City, \$6.
 (57) *Colliery Guardian*, London, England, 5d.
 (58) *Proceedings, Engrs.' Soc. W. Pa.*, 2511 Oliver Bldg., Pittsburgh, Pa., 50c.
 (59) *Proceedings, American Water-Works Assoc.*, Troy, N. Y.
 (60) *Municipal Engineering*, Indianapolis, Ind., 25c.
 (61) *Proceedings, Western Railway Club*, 225 Dearborn St., Chicago, Ill., 25c.
 (62) *Industrial World*, 59 Ninth St., Pittsburgh, Pa., 10c.
 (63) *Minutes of Proceedings, Inst. C. E.*, London, England.
 (64) *Power*, New York City, 5c.
 (65) *Official Proceedings, New York Railroad Club*, Brooklyn, N. Y., 15c.
 (66) *Journal of Gas Lighting*, London, England, 6d.
 (67) *Cement and Engineering News*, Chicago, Ill., 25c.
 (68) *Mining Journal*, London, England, 6d.
 (69) *Der Eisenbau*, Leipzig, Germany.
 (71) *Journal, Iron and Steel Inst.*, London, England.
 (71a) *Carnegie Scholarship Memoirs, Iron and Steel Inst.*, London, England.
 (72) *American Machinist*, New York City, 15c.
 (73) *Electrician*, London, England, 18c.
 (74) *Transactions, Inst. of Min. and Metal*, London, England.
 (75) *Proceedings, Inst. of Mech. Engrs.*, London, England.
 (76) *Brick*, Chicago, Ill., 10c.
 (77) *Journal, Inst. Elec. Engrs.*, London, England, 5s.
 (78) *Beton und Eisen*, Vienna, Austria, 1, 50m.
 (79) *Forschungsarbeiten*, Vienna, Austria.
 (80) *Tonindustrie Zeitung*, Berlin, Germany.
 (81) *Zeitschrift für Architektur und Ingenieurwesen*, Wiesbaden, Germany.
 (82) *Mining and Engineering World*, Chicago, Ill., 10c.
 (83) *Gas Age*, New York City, 15c.
 (84) *Le Ciment*, Paris, France.
 (85) *Proceedings, Am. Ry. Eng. Assoc.*, Chicago, Ill.
 (86) *Engineering-Contracting*, Chicago, Ill., 10c.
 (87) *Railway Engineering and Maintenance of Way*, Chicago, Ill., 10c.
 (88) *Bulletin of the International Ry. Congress Assoc.*, Brussels, Belgium.
 (89) *Proceedings, Am. Soc. for Testing Materials*, Philadelphia, Pa., \$5.
 (90) *Transactions, Inst. of Naval Archts.*, London, England.
 (91) *Transactions, Soc. Naval Archts. and Marine Engrs.*, New York City.
 (92) *Bulletin, Soc. d'Encouragement pour l'Industrie Nationale*, Paris, France.
 (93) *Revue de Métallurgie*, Paris, France, 4 fr. 50.
 (94) *The Boiler Maker*, New York City, 10c.
 (95) *International Marine Engineering*, New York City, 20c.
 (96) *Canadian Engineer*, Toronto, Ont., Canada, 10c.
 (98) *Journal, Engrs. Soc. Pa.*, Harrisburg, Pa., 30c.
 (99) *Proceedings, Am. Soc. of Municipal Improvements*, New York City, \$2.
 (100) *Professional Memoirs, Corps of Engrs.*, U. S. A., Washington, D. C., 50c.
 (101) *Metal Worker*, New York City, 10c.
 (102) *Organ für die Fortschritte des Eisenbahnwesens*, Wiesbaden, Germany.
 (103) *Mining and Scientific Press*, San Francisco, Cal., 10c.
 (104) *The Surveyor and Municipal and County Engineer*, London, England, 6d.
 (105) *Metallurgical and Chemical Engineering*, New York City, 25c.
 (106) *Transactions, Inst. of Min. Engrs.*, London, England, 6s.
 (107) *Schweizerische Bauzeitung*, Zürich, Switzerland.
 (108) *Southern Machinery*, Atlanta, Ga., 10c.
 (109) *Journal, Boston Soc. C. E.*, Boston, Mass., 50c.
 (110) *Journal, Am. Concrete Inst.*, Philadelphia, Pa., 50c.
 (111) *Journal of Electricity, Power and Gas*, San Francisco, Cal., 25c.

LIST OF ARTICLES.

Bridges.

- The Erection of the Boucanne River Viaduct, Canada.* Philip Louis Pratley. (63) Vol. 193.
 The Strengthening of Wrought-Iron Bridges on the Cape Government Railways.* James Mackenzie. (63) Vol. 193.
 Bridges on the Northern Section of the Nagdamuttra State Railway.* John Kerr Robertson. (63) Vol. 193.
 The Design and Construction of the Chicago Great Western Ry. Bridge Over the Mississippi River at St. Paul, Minn.* (86) Dec. 10.
 The Demolition of the Old Southwark Bridge.* (11) Feb. 27.
 Rolling Loads on Railway Girder Bridges.* F. C. Lea. (11) Serial beginning Feb. 27.

*Illustrated.

Bridges—(Continued).

- Protection of Girders from Locomotive Smoke.* H. K. McCay. (60) Mar.
 Construction of the Fallaway Viaduct, Baltimore, Md. Louis R. Gons. (36) Mar.
 Novel Type of Reinforced Concrete Abutment.* Alfred W. Hoffman. (87) Mar.
 Through Arch Bridges of Reinforced Concrete.* A. M. Wolf. (87) Mar.
 Progress on the Haights Run Arch, Pittsburgh.* (13) Mar. 5.
 Some Features of the Design and Construction of the City Waterway Bridge at Tacoma, Wash.* (86) Mar. 11.
 Repairing a Teredo-Eaten Bridge Pier Foundation. (14) Mar. 14.
 Fabrication of Quebec Bridge Members, the Largest and Heaviest Ever Built.* (14) Mar. 14.
 The Langwies Arch.* H. Schuerch. (13) Mar. 19.
 Ultimate Strength of Carbon and Nickel-Steel Models of Quebec Bridge Members.* (14) Mar. 21.
 Design of the 531-Ft. Truss Spans of the North Side Point Bridge, Pittsburgh, Pa.* (86) Mar. 25.
 The Field Work of the Lethbridge Viaduct.* B. Ripley. (96) Mar. 26.
 C. N. O. R. Bridge Over East Sturgeon River.* (96) Mar. 26.
 Scherzer Rolling Lift Bridge for the Indo-Ceylon Connection.* (18) Mar. 28.
 Progress at the Site of Quebec Bridge.* (14) Mar. 28.
 Note sur le Calcul de Quelques Cas Particuliers de Ponts à Béquilles.* R. Despret. (30) Feb.
 Equipment Electrique du Pont à Bascule d'Engelburg à Dordrecht (Hollande).* O. H. Wildt. (33) Feb. 21.
 Passerelle Suspendue de 135 Mètres de Portées Reliant les Usines des Etablissements Arbel, à Douai.* G. Lelnekugel Le Cocq. (73) Feb. 28.
 Die neue Kaiser-Wilhelm-Brücke über die Spree in Fürstenwalde.* Mensch. (40) Feb. 11.
 Ueber die Anwendung der Ritzschen Methode zur Berechnung eines Kuppelgewölbes.* A. Leon und P. Fillunger. (53) Serial beginning Feb. 27.
 Neubau der Streeckbrücke in Hamburg.* Schwoon. (78) Mar. 17.

Electrical.

- Apparatus for Duplex Telegraphy.* Ricardo Lopez. (Abstract translation from *Revista Telegrafica*.) (73) Jan. 9.
 Quenched Spark Wireless Telegraphy.* W. T. Ditcham. (73) Jan. 9.
 The Loading of Aerial Lines and Their Electrical Constants. J. G. Hill. (Abstract of paper read before the Institution of Post Office Elec. Engrs.) (73) Jan. 16.
 The Use of Telegraph Lines for Long-Distance Telephony.* Bela, Gatl. (73) Serial beginning Jan. 16.
 The Tone-Wheel Detector for Wireless Telegraphy.* Rudolf Goldschmidt. (73) Jan. 16.
 Overhead Wire Construction for Medium and Low Pressures.* A. P. Trotter. (Abstract of paper read before the Institution of Post Office Elec. Engrs.) (73) Jan. 23.
 Telephone Transmission. Bancroft Gherardi. (Abstract of paper read before the New York Telephone Soc.) (73) Jan. 30.
 Investigation on the Temperature of Field Coils.* E. H. Rayner. (Paper read before the Inter. Electrochemical Comm.) (73) Jan. 30.
 Laying Telephone Cables Across the Golden Horn, Constantinople.* A. Podmore. (73) Jan. 30.
 Modern Street Illumination. Charles L. Kinsloe. (98) Feb.
 Moderate Capacity Outdoor High Tension Substations.* H. W. Young. (4) Feb.
 Tariffs Dependent on Power Factor. R. Arno. (From papers read before the Inter. Congress at Turin.) (73) Feb. 6.
 The Use of High-Frequency Alternating Currents in Telegraphy, Telephony and for Power Transmission.* A. Malor. (73) Feb. 6.
 Design of the Radio-Telegraph Transmitter. A. S. Blatterman. (73) Serial beginning Feb. 13.
 The Betulander Automatic Telephone System.* (12) Feb. 20.
 Some Proposed Improvements in the Wheatstone Automatic System.* Ricardo Lopez. (Translation from the *Journal Telegraphique*.) (73) Feb. 20.
 Siemens' Automatic Telephone System. (11) Feb. 27.
 Measurement of the Average Value of the Answering Time at Odense Exchange, Denmark.* J. von Linstow. (73) Feb. 27.
 Automatic Telephones at King's College Hospital, London.* (73) Feb. 27.
 The Interpretation of Electric Current Flow in Terms of the Electron Theory. W. F. Durand. (111) Feb. 28.
 The Economical Capacity of a Combined Hydro-Electric and Steam Power Plant.* Cary T. Hutchinson. (42) Mar.
 The Cost of Electricity at the Source. H. M. Hobart. (42) Mar.
 Recording Devices. Charles P. Steinmetz. (42) Mar.
 Comparison of the Telegraph with the Telephone as a Means of Communication in Steam Railroad Operation. M. H. Clapp. (42) Mar.

*Illustrated.

Electrical—(Continued).

- Traffic Studies in Automatic-Switchboard Telephone Systems.* W. Lee Campbell. (42) Mar.
- Voltage Regulation in Electric Distribution System.* G. G. Post. (60) Mar.
- Sixty-Cycle Synchronous Converters. L. P. Crecelius. (42) Mar.
- The Present Physical Knowledge of X Rays. Wheeler P. Davey. (3) Mar.
- Electric Gantry Cranes for Terminals.* F. W. Buse. (95) Mar.
- The Electrification of the Atmosphere, Natural and Artificial.* Oliver Lodge. (77) Mar. 2.
- Electrical Pyrometry.* (47) Serial beginning Mar. 6.
- The Electrical Equipment of the R. M. S. *Britannic*. (73) Mar. 6.
- Electrical Distribution Engineering in Chicago.* (27) Serial beginning Mar. 7.
- Standard Specifications for Poles Western Red Cedar. (111) Mar. 7.
- Electric Power Supply at Sheffield.* (73) Mar. 13.
- The Wet Filtration of Cooling Air for Electrical Machinery. D. A. Hackett. (26) Mar. 13.
- An Electrically-Driven West Country Woolen Mill.* (26) Mar. 13.
- Transmission Plant Without a Switchboard.* Louis Bell. (27) Mar. 14.
- Horn Lightning Arresters.* Charles C. Garrard. (73) Mar. 20.
- The Gott System of Telegraphing Through Long Submarine Cables.* (26) Mar. 20.
- Reinforced-Concrete Poles withstand Blizzard, Heavy Snow and Sleet Storm in Vicinity of New York Breaks Wooden Poles and Interrupts Telephone and Telegraph Communication.* (14) Mar. 21.
- Combination Power Plant and Pumping Station, Kansas City.* (27) Mar. 21.
- Electricity and Matter. Henry S. Carhart. (111) Mar. 21.
- Steam and Hydroelectric Generating System.* (27) Mar. 28.
- Donaldsonville, La., Electric-Light and Water-Works Plant.* E. M. Ivens. (64) Mar. 31.
- Discrimination in Rates for Electricity.* Henry D. Jackson. (64) Mar. 31.
- Turbo-Alternateur Parsons de 25 000 Kilowatts, de la Commonwealth Edison Co., de Chicago.* (33) Mar. 7.
- Die elektrische Küche im Grossbetrieb.* W. Schulz. (7) Feb. 14.
- Elektrische betriebener, im Güterzüge einstellbarer Drehkran für Greiferbetrieb.* E. Borghaus. (102) Feb. 15.
- Das Marmorlicht.* W. Voegel. (41) Feb. 19.
- Die neue Fernleitungsstelle in München.* Wilhelm Schreiber. (41) Serial beginning Feb. 26.
- Versuche über die Beeinflussung des Wachstums der Pflanzen durch Elektrizität.* Herbert G. Dorsey. (41) Feb. 26.
- Elektrische Fernschreiber. C. Beckmann. (41) Mar. 12.
- Ueber Stossender der drahtlosen Telegraphie.* Eugen Nesper. (41) Serial beginning Mar. 19.
- Die Elektrizitätsversorgung in Bayern.* F. X. Gebele. (41) Mar. 19.
- Spitzenzähler, Relaiszähler, Ueberschreitungszähler.* K. Laudien. (41) Mar. 19.

Marine.

- Modern German Warship Design.* (12) Feb. 27.
- Patent Barge for Coaling the *Imperator* and Other Large Hamburg-American Steamships.* F. C. Coleman. (95) Mar.
- The Navy and the Panama Canal. Harry S. Knapp. (From *Proceedings*, United States Naval Inst.) (44) Mar.
- The Strategic Aspect of the Panama Canal.* Vaughan Cornish. (44) Mar.
- Vulcan Marine Steam Turbines.* Alfred Gradenwitz. (64) Mar. 3.
- Life Saving Appliances. John Harvard Biles. (Paper read before the North-East Coast Institution of Engrs. and Shipbuilders.) (11) Serial beginning Mar. 6.
- The Motor Ship *Sebastian*.* (12) Mar. 6.
- The White Star Liner *Britannic*.* (11) Feb. 27; (12) Feb. 27; (47) Mar. 6; (19) Mar. 14.
- Motor-Cruiser and Paraffin Marine Motors.* (11) Mar. 13.
- The Strength of Stayed Flat Plates. C. E. Stromeyer. (Paper read before the Manchester Steam Users' Assoc.) (12) Mar. 13.
- Freeboard by Formula.* Arthur A. Liddell. (12) Mar. 13.
- A Remarkable Boiler (Marine).* (12) Mar. 13.
- The "Thermos Bottle" Barges of the Lehigh Valley Railroad.* (13) Mar. 19.
- Carrels' Marine Oil-Engines.* (11) Mar. 20.
- The Aero and Marine Exhibition. (11) Serial beginning Mar. 20.
- The Failure of Condenser Tubes. Henry J. Oram. (Paper read before the Inst. of Metals.) (12) Mar. 20.
- South American Liner *Cap Trafalgar*.* (12) Mar. 20.
- A Real Lifeboat (the *Bride*).* Robert G. Skerrett. (46) Mar. 21.
- Cutting up Wreck of Steel Ship with Oxyacetylene Torch.* (14) Mar. 21.
- The Oil-Burning Steam Yacht *Cypress*.* (19) Mar. 28.
- Schwimmkörper und Schiffe aus Eisenbeton.* O. Colberg. (78) Mar. 5.

*Illustrated.

Mechanical.

- The Absorption of Oxygen by Coal.* T. F. Winmill. (106) Vol. 46, Pt. 3.
 A New Method of Coaling Gas-Engines. Bertram Hopkinson. (75) July.
 Strength of Equipment for Handling Loads.* Edward Godfrey. (58) Jan.
 The Manufacture of By-Product Coke.* T. V. Salt. (4) Feb.
 A Visit to the Works of the Lanston Monotype Corporation.* (12) Serial beginning Feb. 20.
 Turbo-Fan for Forced Draught.* (12) Feb. 20.
 Carbonization in Bulk for Gas Production.* G. Stanley Cooper. (Paper read before the London and Southern Junior Gas Assoc.) (66) Feb. 24.
 The Clinkering of Coal and Its Composition. Oscar W. Palmenberg. (Paper read before the Am. Soc. of Chemical Industry.) (47) Feb. 27.
 Handling Steamship Package Freight.* Willard C. Brinton. (95) Mar.
 Inclined Elevators for Economical Handling of Freight.* (95) Mar.
 The Economical Handling of Package Freight and General Cargo on Steamship Docks.* C. A. Hardy. (95) Mar.
 The Manufacture and Uses of Blaugas. Hugo Lieber. (105) Mar.
 Economical Lubrication. W. W. Davis. (Paper read before the Lake Superior Min. Inst.) (45) Mar.
 On the Theoretical Efficiency of the Linde Process of Liquefying Air. M. M. Garver. (3) Mar.
 High Pressures and Five Kinds of Ice. P. W. Bridgman. (3) Mar.
 Standardizing Machinery. Fred H. Colvin. (55) Mar.
 Standardization of Pipe Thread Gages. (Report of Committee, Am. Soc. of Mech. Engrs.) (55) Mar.
 Standard Threads for Hose Couplings.* (Report of Sub-committee on Fire Protection, Am. Soc. of Mech. Engrs.) (55) Mar.
 Power from Mercury Vapor. W. L. R. Emmet. (42) Mar.
 Comparative Tests of Three Types of Bearings.* Carl C. Thomas, E. R. Mauer and L. E. A. Kelso. (55) Mar.
 Modernizing a Southern Lime Mill.* Ellis Soper. (Paper read before the Am. Assoc. for the Advancement of Science.) (67) Mar.
 High-Pressure Gas for Street Lighting. T. Singleton. (60) Mar.
 Pulverized Coal in Malleable Plant.* (62) Mar. 2.
 Experiences in Automobile Operation.* Geo. P. Smith, Jr. (Paper read before the New England Assoc. of Gas Engrs.) (83) Mar. 2.
 Comparison of Joints for Cast-Iron Mains.* H. B. Coho. (Paper read before the Am. Gas Inst.) (83) Mar. 2.
 Vertical Retort Settings in English Works. C. A. Learned. (Paper read before the New England Assoc. of Gas Engrs.) (83) Mar. 2; (24) Mar. 2.
 Gas-Producer Operations.* E. G. Moon. (64) Mar. 3.
 Chimney Capacity for Burning Waste Fuels. David Moffat Myers. (64) Mar. 3.
 Feeding Refrigerating Coils.* (64) Mar. 3.
 Steam-Raising by Gas-Coke. E. W. L. Nicol. (66) Mar. 3.
 The Running of Coal and Coke-Handling Machinery as Applied to Horizontal Retorts. W. H. Adams. (Paper read before the Midland Assoc. of Gas Mgrs.) (66) Mar. 3.
 Building Large Gas Engine Flywheels.* J. H. B. Bryan. (20) Mar. 5.
 Electrical Pyrometry.* (47) Serial beginning Mar. 6.
 Magnetic Clutches for Rolling Mills.* (22) Mar. 6.
 Elements of Fuel Oil Practice and Boiler Testing.* Robert Sibley. (111) Serial beginning Mar. 7.
 Recommendations for Standard Specifications, Horizontal Water Tube Boilers. Thomas E. Durban. (Paper read before the National Assoc. of Tubular Boiler Mfrs.) (62) Mar. 9.
 Remodeled Railway, Electric and Ice-Making Plant at Hampton, Va.* Warren O. Rogers. (64) Mar. 10.
 Some Results of Twenty-Four Hour Plant Test.* B. R. T. Collins. (64) Mar. 10.
 Scoot in Relation to Boiler Economy. F. W. Linaker. (64) Mar. 10.
 Refractory Materials in Gas-Works. J. W. Mellor. (Paper read before the Manchester District Junior Gas Assoc.) (66) Mar. 10.
 Gas or Fuel Oil for Heating Furnaces; Which? C. F. Herington. (72) Mar. 12.
 A Diesel Engine-Driven Air-Lift Pumping Plant.* (12) Mar. 13.
 The Moore By-Product Recovery Gas Producer.* (12) Mar. 13.
 Economy and Standardisation in Nuts.* (11) Mar. 13.
 Formulae for the Windage of Steam-Turbine Wheels. E. Buckingham. (11) Mar. 13.
 The Biggest of French Dirigibles.* Carl Dienstbach. (46) Mar. 14.
 Profit or Loss with the Steam Shovel. P. S. Fitzgerald. (14) Mar. 14.
 The Installation of Cast-Iron Mains.* Walton Forstall. (Paper read before the Am. Gas Inst.) (24) Serial beginning Mar. 16.
 Standard Street Main Practice. G. I. Vincent. (Paper read before the Am. Gas Inst.) (83) Mar. 16.
 Improvements in English Gas Producers.* Arthur H. Allen. (64) Mar. 17.

*Illustrated.

Mechanical—(Continued).

- Working Up a Boiler Test. F. R. Low. (64) Mar. 17.
 Applications of Combined Swing Gate and Check Valves.* Oscar C. Schmidt. (64) Mar. 17.
 A 10 000-Ton Hydraulic Forging Press.* C. von Philip. (20) Mar. 19.
 Small Steel Castings as a Specialty. C. S. Koch. (Paper read before the Pittsburgh Foundrymen's Assoc.) (20) Mar. 19; (62) Mar. 16.
 Power Economics for Intermittent Loads.* E. Ivor David. (Paper read before the Rugby Eng. Soc.) (47) Serial beginning Mar. 20.
 A New Cement Works near Ipswich.* (12) Mar. 20.
 The Salmson Aeronautical Motor.* (12) Mar. 20.
 Sun-Power Plant at Cairo.* (12) Mar. 20.
 The Aero and Marine Exhibition.* (11) Serial beginning Mar. 20.
 Mixing Plant for Coking Coals.* F. Korten. (From *Glückauf*.) (57) Mar. 20.
 Dumping Conveyor at the Brakpan Gold Mines.* (46) Mar. 21.
 System of Heating and Lighting by Gas, Panama-Pacific International Exposition.* (111) Mar. 21; (83) Apr. 1.
 Condensing Equipment. Frank R. Wheeler. (111) Mar. 21.
 Gas Engine Practice with Large Units. A. T. Kasley. (Paper read before the N. A. S. E.) (62) Mar. 23.
 The Balboa Foundry for the Panama Canal.* James H. Knapp. (20) Mar. 26.
 Condensed Steel-Mixture in Machine Tool Castings.* H. M. Ramp. (72) Mar. 26.
 Machine for Drawing Automobile Radiators and Other Tubes.* F. H. Stolp. (72) Mar. 26.
 The Combustion of Coal and Smoke Abatement.* Samuel B. Flagg. (Paper read before the Cleveland Eng. Soc.) (62) Mar. 30.
 Machine-Tool Operations at High Cutting Speeds.* George S. Armstrong. (9) Apr.
 Ford Methods* and the Ford Shops.* Horace L. Arnold. (9) Serial beginning Apr.
 Trenching Machines *versus* Hand Digging.* C. B. Strohn. (Paper read before the Illinois Gas Assoc.) (83) Apr. 1.
 Les Progrès Récents dans la Commande Electrique des Laminoirs.* G. Rouet et C. Voisin. (93) Feb.
 L'Utilisation pour la Force Motrice des Sources de Vapeur naturelle de la Toscane.* G. Espitalier. (33) Feb. 21.
 Potentiels et Représentations Géométriques de la Thermodynamique.* Ch. Colombi. (37) Feb. 28.
 Die fünfte internationale Luftschiffahrt-Ausstellung in Paris vom 5. bis zum 25. Dezember 1913.* W. Kaemmerer. (48) Jan. 24.
 Feuersgefahr bei Luftschiffen.* A. Baumann. (48) Jan. 24.
 Versuche an einem Dampf-Wasserwärmer im Gegen- und Gleichstrom.* A. Gramberg. (48) Jan. 31.
 Die Aufbereitung und Beförderung des Formsandes in der neuen Giesserei von Gebrüder Bühler, Uzwil (Schweiz).* H. Behrens. (48) Jan. 31.
 Unreiner Dampf.* F. Döhne. (48) Feb. 7.
 Turmkranne für Bauausführungen.* Wintermeyer. (48) Feb. 7.
 Neuere Elektrohängebahnen in Giessereien.* Hans Wettich. (50) Feb. 26.
 Zur Wärmetheorie des Drehrohrofens bei Dickschlamm- und Trockenverfahren. Otto Dormann. (80) Feb. 28.
 Neubau der Oberschlesischen Portlandzementfabrik in Oppeln.* Ruoff. (78) Serial beginning Mar. 5.
 Motorische Bodenbearbeitung mit Ausschluss der Selddampfpflüge.* Ludwig Gröger. (53) Serial beginning Mar. 13.

Metallurgical.

- The Annealing of Steel in Continuous Furnaces.* H. Brearley. (22) Feb. 27.
 Electric Furnace for Copper Alloys. G. H. Clamer. (Paper read before the Am. Inst. of Metals.) (47) Feb. 27.
 Resistivity of Brass; Solid and Molten.* Edwin F. Northrup. (105) Mar.
 Electro-Metallurgy of Iron and Steel. Woolsey McA. Johnson. (105) Mar.
 The Boiler Plant of the Blast Furnace. J. E. Johnson, Jr. (105) Mar.
 Utilization of Blast Furnace Slag in Germany. A. M. Thackara. (62) Mar. 2.
 How High Sulphur Content Affects Iron Castings. W. F. Prince. (72) Mar. 5.
 Treatment of Cyanide Precipitate.* Herbert A. Megraw. (16) Serial beginning Mar. 7.
 Lead Smelting in the Open Hearth. H. B. Pulsifer. (82) Serial beginning Mar. 7.
 Assembling and Erecting Wooden Tanks.* J. M. Lillgren. (103) Mar. 7.
 Increasing the Efficiency of a Grinding Pan. John Randall. (103) Mar. 7.
 The Iron and Steel Works at Hanyang, China.* Edwin A. Sperry. (20) Mar. 12.
 Witherbee-Sherman No. 4 Magnetic Separator.* J. S. Pellett. (16) Mar. 14.
 The Influence of Nickel on Some Copper-Aluminium Alloys.* A. A. Read and R. H. Graves. (Paper read before the Inst. of Metals.) (11) Mar. 20.
 Bronze.* John Dewrance. (Paper read before the Inst. of Metals.) (11) Mar. 20.

*Illustrated.

Mechanical—Continued.

- Winding Up a Boiler Test. E. H. Lane. (41) Mar. 27.
 Application to Combined Steam and Check Valves. Oscar C. Schmidt. (42) Mar. 27.
- Small Size Hydraulic Testing Press. C. von Wolff. (101) Mar. 28.
 Small Size Hydraulic Testing Press. C. von Wolff. (102) Mar. 28.
 Paper Pumping Machine. (103) Mar. 28.
 Paper Pumping Machine. (104) Mar. 28.
 Paper Pumping Machine. (105) Mar. 28.
 Paper Pumping Machine. (106) Mar. 28.
 Paper Pumping Machine. (107) Mar. 28.
 Paper Pumping Machine. (108) Mar. 28.
 Paper Pumping Machine. (109) Mar. 28.
 Paper Pumping Machine. (110) Mar. 28.
 Paper Pumping Machine. (111) Mar. 28.
 Paper Pumping Machine. (112) Mar. 28.
 Paper Pumping Machine. (113) Mar. 28.
 Paper Pumping Machine. (114) Mar. 28.
 Paper Pumping Machine. (115) Mar. 28.
 Paper Pumping Machine. (116) Mar. 28.
 Paper Pumping Machine. (117) Mar. 28.
 Paper Pumping Machine. (118) Mar. 28.
 Paper Pumping Machine. (119) Mar. 28.
 Paper Pumping Machine. (120) Mar. 28.
 Paper Pumping Machine. (121) Mar. 28.
 Paper Pumping Machine. (122) Mar. 28.
 Paper Pumping Machine. (123) Mar. 28.
 Paper Pumping Machine. (124) Mar. 28.
 Paper Pumping Machine. (125) Mar. 28.
 Paper Pumping Machine. (126) Mar. 28.
 Paper Pumping Machine. (127) Mar. 28.
 Paper Pumping Machine. (128) Mar. 28.
 Paper Pumping Machine. (129) Mar. 28.
 Paper Pumping Machine. (130) Mar. 28.
 Paper Pumping Machine. (131) Mar. 28.
 Paper Pumping Machine. (132) Mar. 28.
 Paper Pumping Machine. (133) Mar. 28.
 Paper Pumping Machine. (134) Mar. 28.
 Paper Pumping Machine. (135) Mar. 28.
 Paper Pumping Machine. (136) Mar. 28.
 Paper Pumping Machine. (137) Mar. 28.
 Paper Pumping Machine. (138) Mar. 28.
 Paper Pumping Machine. (139) Mar. 28.
 Paper Pumping Machine. (140) Mar. 28.
 Paper Pumping Machine. (141) Mar. 28.
 Paper Pumping Machine. (142) Mar. 28.
 Paper Pumping Machine. (143) Mar. 28.
 Paper Pumping Machine. (144) Mar. 28.
 Paper Pumping Machine. (145) Mar. 28.
 Paper Pumping Machine. (146) Mar. 28.
 Paper Pumping Machine. (147) Mar. 28.
 Paper Pumping Machine. (148) Mar. 28.
 Paper Pumping Machine. (149) Mar. 28.
 Paper Pumping Machine. (150) Mar. 28.
 Paper Pumping Machine. (151) Mar. 28.
 Paper Pumping Machine. (152) Mar. 28.
 Paper Pumping Machine. (153) Mar. 28.
 Paper Pumping Machine. (154) Mar. 28.
 Paper Pumping Machine. (155) Mar. 28.
 Paper Pumping Machine. (156) Mar. 28.
 Paper Pumping Machine. (157) Mar. 28.
 Paper Pumping Machine. (158) Mar. 28.
 Paper Pumping Machine. (159) Mar. 28.
 Paper Pumping Machine. (160) Mar. 28.
 Paper Pumping Machine. (161) Mar. 28.
 Paper Pumping Machine. (162) Mar. 28.
 Paper Pumping Machine. (163) Mar. 28.
 Paper Pumping Machine. (164) Mar. 28.
 Paper Pumping Machine. (165) Mar. 28.
 Paper Pumping Machine. (166) Mar. 28.
 Paper Pumping Machine. (167) Mar. 28.
 Paper Pumping Machine. (168) Mar. 28.
 Paper Pumping Machine. (169) Mar. 28.
 Paper Pumping Machine. (170) Mar. 28.
 Paper Pumping Machine. (171) Mar. 28.
 Paper Pumping Machine. (172) Mar. 28.
 Paper Pumping Machine. (173) Mar. 28.
 Paper Pumping Machine. (174) Mar. 28.
 Paper Pumping Machine. (175) Mar. 28.
 Paper Pumping Machine. (176) Mar. 28.
 Paper Pumping Machine. (177) Mar. 28.
 Paper Pumping Machine. (178) Mar. 28.
 Paper Pumping Machine. (179) Mar. 28.
 Paper Pumping Machine. (180) Mar. 28.
 Paper Pumping Machine. (181) Mar. 28.
 Paper Pumping Machine. (182) Mar. 28.
 Paper Pumping Machine. (183) Mar. 28.
 Paper Pumping Machine. (184) Mar. 28.
 Paper Pumping Machine. (185) Mar. 28.
 Paper Pumping Machine. (186) Mar. 28.
 Paper Pumping Machine. (187) Mar. 28.
 Paper Pumping Machine. (188) Mar. 28.
 Paper Pumping Machine. (189) Mar. 28.
 Paper Pumping Machine. (190) Mar. 28.
 Paper Pumping Machine. (191) Mar. 28.
 Paper Pumping Machine. (192) Mar. 28.
 Paper Pumping Machine. (193) Mar. 28.
 Paper Pumping Machine. (194) Mar. 28.
 Paper Pumping Machine. (195) Mar. 28.
 Paper Pumping Machine. (196) Mar. 28.
 Paper Pumping Machine. (197) Mar. 28.
 Paper Pumping Machine. (198) Mar. 28.
 Paper Pumping Machine. (199) Mar. 28.
 Paper Pumping Machine. (200) Mar. 28.

*Illustrated.

Metallurgical—(Continued).

- A Modern Plant Making Cold Drawn Steel.* (20) Mar. 26.
 Mines and Mill of the Globe Con., California.* A. H. Martin. (82) Mar. 28.
 Hydro-Metallurgical Treatment of Copper. Edward Ray Weldlein. (82) Mar. 28.
 La Métallurgie du Cuivre au Convertisseur Basique (Convertisseur Pierce-Smith).
 Bernard de Saint-Seine. (93) Feb.
 Les Fours Poussants avec Chauffage au Gaz par Vole de Régénération et Avec
 Direction Constante des Flamme.* E. Schreiber. (93) Feb.
 L'Epuración a Sec des Gaz de Haut Fourneaux par la Procédé Beth-Halberg.* (33)
 Mar. 14.
 Die beschleunigte Cowperbeheizung nach dem Verfahren von Pfoser-Strack-Stumm.*
 (50) Feb. 19.

Mining.

- A Method of Measuring Goaf Temperatures. T. F. Winmill. (106) Vol. 46, Pt. 3.
 The Advancement in Bituminous Coal Mining.* S. A. Taylor. (58) Jan.
 Design and Maintenance of Miner's Electric Lamps.* F. J. Turquand. (Paper
 read before the Assoc. of Min. Elec. Engrs.) (22) Feb. 20; (57) Feb. 20.
 Wet Peat Zones for Arresting Coal-dust Explosions.* R. Cremer. (57) Feb. 20.
 An Aerial Tramway to Chinese Coal Mines.* C. A. Tupper. (103) Feb. 28.
 The Longwall Method of Mining.* Alexander Sharp. (Paper read before the
 Canadian Min. Inst.) (45) Mar.
 Nature of Permissible Explosives. Clarence Hall. (Abstract of paper read before
 the West Virginia Min. Inst.) (45) Mar.
 Steel Corporation Mines at Gary.* William Z. Price. (45) Mar.
 British Coal-Dust Precautions. C. F. J. Galloway. (45) Mar.
 Black Diamond Concrete Tipples.* Wilbur Greeley Burroughs. (45) Mar.
 Gob Fire at a West Yorkshire Colliery. H. F. Smithson. (Paper read before the
 National Assoc. of Colliery Mgrs.) (22) Mar. 6.
 Nationalisation of Mines and Minerals. Henry Louis. (Paper read before the
 Economic Soc.) (22) Mar. 6.
 Cut and Fill Method in Wide Orebody.* (16) Mar. 7.
 Change House with Novel Features.* Floyd L. Burr. (Abstract of paper read
 before the Lake Superior Min. Inst.) (16) Mar. 7.
 Drift Mining in the Frozen Gravel Deposits of Cape Nome.* Arthur Gibson. (103)
 Mar. 7.
 A Comparative Cost Study of Steam and Electric Equipment for a 1500-Ton Coal
 Mine. Ralph D. Brown. (86) Mar. 11.
 Electric Pumping Plant at Tiltmanstone Colliery.* H. J. Wroe. (Paper read be-
 fore the Assoc. of Min. Elec. Engrs.) (57) Mar. 13.
 Alaska-Treadwell Gold Mine and Works.* H. C. Meek. (Abstract from paper
 read before the Canadian Min. Inst.) (82) Mar. 14.
 The Victorian Dredging Industry. (From the *Australian Mining Standard*.) (103)
 Mar. 14.
 Mining and Washing Brown Hematite Ores. W. R. Dodge. (103) Mar. 14.
 The Theory and Practice of Sampling, and Calculation of Ore Reserves.* W. J. N.
 Denmachie. (68) Serial beginning Mar. 14.
 Markham Colliery.* (22) Mar. 20.
 Secondary Haulage in Coal Mines.* J. Shanks. (Abstract from paper read before
 the Canadian Min. Inst.) (82) Mar. 21.
 Mining in Peru in 1913.* Lester W. Strauss. (103) Mar. 21.
 Construction of an All Steel Dredge.* Lewis H. Eddy. (16) Serial beginning
 Mar. 28.
 Tonggrabmaschinen für senkrechten oder wagerechten Abbau.* P. Sanis. (80)
 Feb. 28.

Miscellaneous.

- A Few Notes on Engineering Research and Its Co-Ordination.* G. H. Roberts.
 (75) July.
 Modern Methods of Measuring Temperature.* Robert S. Whipple. (75) July.
 Retaining Walls.* James Warren Pearl. (4) Feb.
 Cost Accounting on Construction Work. Leslie H. Allen. (109) Mar.
 Engineering and Accounting, Their Relation with Special Reference to Public
 Utilities. J. B. Scholefield. (Paper read before the Utah Soc. of Engrs.)
 (1) Mar.
 Contractors' Camp for Working on the New Quebec Bridge.* L. G. Jost. (13)
 Mar. 5.
 The Art of Making Rapid and Reliable Preliminary Estimates of Cost. Allen
 Hazen. (86) Mar. 18.
 La Manutention et l'Emmagasinage des Liquides Inflammables, sans Danger
 d'Incendie, par les Procédés Martini et Huneke.* P. Munic. (92) Feb.

*Illustrated.

Municipal.

- Average Life of Street Pavements in American Cities. (86) Dec. 10.
 Why Tar-Slag Blinds Well. Reginald Ryves, Assoc. M. Inst. C. E. (104) Feb. 27.
 London Street Paving. (104) Feb. 27.
 Aggregate for Concrete Roads.* Sanford E. Thompson. (Paper read before the Conference on Concrete Road Construction.) (60) Mar.
 The Maintenance of Concrete Roads. (Report of Committee at the Chicago Conference on Concrete Road Building.) (60) Mar.
 Relieving Traffic on Congested Streets.* Max J. Welch. (60) Mar.
 The Importance of Highway Maintenance. Leonard S. Smith, M. Am. Soc. C. E. (60) Mar.
 Method of Constructing Concrete Pavement. Paul E. Kressly. (60) Mar.
 Tarred Concrete in Portland, Me.* Edwin D. Lynch. (60) Mar.
 Bitulithic Pavement and Warrenite Roadway.* G. H. Perkins. (109) Mar.
 General Methods of Concrete Road Construction in Ohio; Conclusions from Service Records. H. D. Brunning. (Paper read before the National Conference on Concrete Road Building.) (86) Mar. 4.
 Construction of the Crackless Concrete Pavement. S. T. Morse. (86) Mar. 4.
 Methods and Cost of Constructing a Bituminous Macadam Road Across Lava Flows on the Island of Hawaii. M. J. Adams. (86) Mar. 4.
 Progress in Manufacturing Vitrified Paving Brick; the Wire-Cut-Lug Brick.* William C. Perkins. (13) Mar. 5.
 Surface Drainage at Street Intersections.* Paul E. Kressly. (13) Mar. 5.
 Road Construction and Maintenance.* H. M. Lawson. (Paper read before the Institution of Mun. and County Engrs.) (104) Mar. 6.
 Handling Materials for Concrete Roads. (14) Mar. 7.
 Concrete Streets in Chicago a Failure.* Irwin Charles Walker. (76) Mar. 7.
 Reinforced-Concrete Pavements. B. S. Pease. (14) Mar. 7.
 Methods and Apparatus for Determining Effect of Climate on Road Surfaces, Scotch Experimental Roads.* (86) Mar. 11.
 Pavement Work in St. John, N. B.* (96) Mar. 12.
 Town Planning and Arterial Roads. Thomas Adams. (Report made to the Local Government Board.) (104) Mar. 20.
 The Need of a Traffic Census. J. Pease Norton. (19) Mar. 21.
 The Economics of Macadam *versus* Earth Road Construction. J. E. Tupper. (86) Mar. 25.
 History of Bituminous Concrete Pavements in Which Broken Stone or Gravel is Used. Joseph H. Conzelman. (Paper read before the Am. Assoc. for the Advancement of Science.) (86) Mar. 25.
 Method and Cost of Constructing Top Soil Roads in Virginia. A. H. Pettigrew. (86) Mar. 25.
 History of the Construction of Broken Stone Roads. R. L. Morrison. (Paper read before the Am. Assoc. for the Advancement of Science.) (96) Mar. 26.
 The Use of Concrete in the Construction of Roads. Charles E. Foote. (19) Mar. 28.
 Zur Vereinheitlichung der Abmessungen der Grosspflastersteine. Günther. (39) Feb. 5.

Railroads.

- Locomotive Boiler Inspection Law.* Frank McManamy. (61) Dec. 16.
 Electrification of the L. & N. W. Railway's Suburban Lines.* (73) Jan. 16.
 The Indo-Ceylon Connection.* (23) Feb. 20; (12) Feb. 27.
 Alternating-Current Locomotives for Main Lines.* (23) Serial beginning Feb. 20.
 New Line Over Wasatch Mountains.* (23) Feb. 20.
 Rail Corrugation.* A. Busse. (73) Feb. 20.
 Some Recent Baldwin Locomotives.* (23) Feb. 27.
 Storage Battery Motor Cars on the Prussian-Hessian State Railways.* (18) Feb. 28.
 Railway Fires and Means for Their Prevention.* C. N. Rambo. (Paper read before the Ry. Fire Protection Assoc.) (18) Feb. 28.
 Locomotive Terminal of the Western Maryland Ry. at Maryland Junction, W. Va.* (18) Feb. 28.
 Opening of the Yamhill Loop, Portland, Eugene & Eastern Interurban System.* (18) Feb. 28.
 Handling and Removing Snow.* J. W. Powers. (87) Mar.
 New Train for the Manchester-Southport Service, Lancashire and Yorkshire Railway.* (21) Mar.
 Automatic Signalling on the East London Railway.* (21) Mar.
 Gas-Electric Motor Cars for Railways.* (21) Mar.
 4-6-0 Mixed Traffic Engines, London and South Western Railway.* (21) Mar.
 Lehigh Valley Pacific Type Locomotive.* (25) Mar.
 Reinforced Concrete Coalging Station (Indiana Harbor Belt Railway).* (25) Mar.
 Strength of Locomotive Boilers.* Wm. N. Allman. (25) Mar.

*Illustrated.

- Strength of Locomotive Buffers* Wm. N. Allman (428) Mar.
- Reinforced Concrete Circular Slabs (London Harbor Pier Railway)* (427) Mar.
- Design of a New Type Locomotive* (426) Mar.
- 4-6-0 Mixed Traffic Engines, London and South Western Railway* (425) Mar.
- Gas-Electric Motor Cars for Railways* (424) Mar.
- Automatic Signalling on the East London Railway* (423) Mar.
- New Train for the Manchester-Salford District, Lancashire and Yorkshire Rail-
way* (422) Mar.
- Handling and Removing Snow* J. W. Turner (421) Mar.
- Opening of the Tynemouth Loop, Portland, Dorset & Western Interurban System*
(420) Feb. 28.
- Locomotive Turntable of the Western Railway Co. at Maryland Junction, W. Va.
(419) Feb. 28.
- the Ry. Pipe Production Assoc. (418) Feb. 28.
- Railway Ties and Means for Their Prevention* G. N. Rumber (Paper read before
Feb. 28.
- Stoke Newington Motor Cars on the Transmancheur State Railway* (417)
- Some Recent Railway Locomotives* (416) Feb. 27.
- Rail Construction* A. Hume (415) Feb. 26.
- New Line Over Wensley Mountains* (414) Feb. 26.
- Acceleration-Curvature Locomotives for Main Lines* (413) Serial beginning Feb. 26.
- The Indo-Canton Connection* (412) Feb. 26.
- Electrification of the I. & N. W. Railway* (411) Jan. 18.
- Locomotive Buffer Inspection Law* Frank McManaway (410) Dec. 16.
- Netherlands.
- Zur Veredelung der Antriebsorgane der Grossschienenbahnen (Grooten)
Mar. 28.
- The Use of Concrete in the Construction of Roads, Bridges, etc. (19)
before the Ass. Assoc. for the Advancement of Science (190) Mar. 28.
- History of the Construction of Modern Roadways, H. J. Woodhead (Paper read
Mar. 28.
- Methods and Cost of Constructing Top Soil Roads in Virginia, H. H. Woodhead
Abstracts of Reports (190) Mar. 28.
- Study of Structures, Concrete Pavements in Which Inlets, Slides or Grates are
used, H. J. Woodhead (Paper read before the Ass. Assoc. for the Advancement of
Science (190) Mar. 28.
- The Need of a Traffic Census, J. Evans (Paper read before the Ass. Assoc. for the
Advancement of Science (190) Mar. 28.
- Government Roads, (190) Mar. 28.
- Town Planning and Aesthetic Needs, Thomas Adams (Paper read before the Ass.
Mar. 28.
- Pavement Work in St. Louis, Mo. (190) Mar. 28.
- Experimental Roads* (189) Mar. 11.
- Methods and Apparatus for Determining Effect of Climate on Road Surfaces, Grooten
(188) Mar. 7.
- Concrete Bridges in Ontario* (187) Mar. 7.
- Handling Materials for Concrete Roads* (186) Mar. 7.
- Construction of Main and Concrete Bridges* (185) Mar. 6.
- Road Construction and Maintenance* H. J. Woodhead (Paper read before the
Ass. Assoc. for the Advancement of Science (190) Mar. 6.
- Survey Districts at River Intersections* Paul H. Woodhead (184) Mar. 2.
- Widening of Roads* (183) Mar. 2.
- Progress in Manufacturing Vehicles, H. J. Woodhead (Paper read before the Ass.
Mar. 2.
- on the Island of Java, H. J. Woodhead (182) Mar. 2.
- Methods and Cost of Constructing a Highway, H. J. Woodhead (Paper read before the
Ass. Assoc. for the Advancement of Science (190) Mar. 2.
- Construction of the Canadian Concrete Pavement, H. J. Woodhead (181) Mar. 2.
- Concrete Road Building* (180) Mar. 2.
- General Methods of Concrete Road Construction in Ohio; Construction from Experience
and from the National Conference on Highway Maintenance, H. J. Woodhead (179) Mar. 2.
- The Importance of Highway Maintenance, Leonard S. Smith, Jr. and H. J. Woodhead
(178) Mar. 2.
- Hollowing Traffic on Concrete Roads, Mar. 2.
- Concrete Road Building* (177) Mar. 2.
- Concrete Road Building* (176) Mar. 2.
- Concrete Road Building* (175) Mar. 2.
- Concrete Road Building* (174) Mar. 2.
- Concrete Road Building* (173) Mar. 2.
- Concrete Road Building* (172) Mar. 2.
- Concrete Road Building* (171) Mar. 2.
- Concrete Road Building* (170) Mar. 2.
- Concrete Road Building* (169) Mar. 2.
- Concrete Road Building* (168) Mar. 2.
- Concrete Road Building* (167) Mar. 2.
- Concrete Road Building* (166) Mar. 2.
- Concrete Road Building* (165) Mar. 2.
- Concrete Road Building* (164) Mar. 2.
- Concrete Road Building* (163) Mar. 2.
- Concrete Road Building* (162) Mar. 2.
- Concrete Road Building* (161) Mar. 2.
- Concrete Road Building* (160) Mar. 2.
- Concrete Road Building* (159) Mar. 2.
- Concrete Road Building* (158) Mar. 2.
- Concrete Road Building* (157) Mar. 2.
- Concrete Road Building* (156) Mar. 2.
- Concrete Road Building* (155) Mar. 2.
- Concrete Road Building* (154) Mar. 2.
- Concrete Road Building* (153) Mar. 2.
- Concrete Road Building* (152) Mar. 2.
- Concrete Road Building* (151) Mar. 2.
- Concrete Road Building* (150) Mar. 2.
- Concrete Road Building* (149) Mar. 2.
- Concrete Road Building* (148) Mar. 2.
- Concrete Road Building* (147) Mar. 2.
- Concrete Road Building* (146) Mar. 2.
- Concrete Road Building* (145) Mar. 2.
- Concrete Road Building* (144) Mar. 2.
- Concrete Road Building* (143) Mar. 2.
- Concrete Road Building* (142) Mar. 2.
- Concrete Road Building* (141) Mar. 2.
- Concrete Road Building* (140) Mar. 2.
- Concrete Road Building* (139) Mar. 2.
- Concrete Road Building* (138) Mar. 2.
- Concrete Road Building* (137) Mar. 2.
- Concrete Road Building* (136) Mar. 2.
- Concrete Road Building* (135) Mar. 2.
- Concrete Road Building* (134) Mar. 2.
- Concrete Road Building* (133) Mar. 2.
- Concrete Road Building* (132) Mar. 2.
- Concrete Road Building* (131) Mar. 2.
- Concrete Road Building* (130) Mar. 2.
- Concrete Road Building* (129) Mar. 2.
- Concrete Road Building* (128) Mar. 2.
- Concrete Road Building* (127) Mar. 2.
- Concrete Road Building* (126) Mar. 2.
- Concrete Road Building* (125) Mar. 2.
- Concrete Road Building* (124) Mar. 2.
- Concrete Road Building* (123) Mar. 2.
- Concrete Road Building* (122) Mar. 2.
- Concrete Road Building* (121) Mar. 2.
- Concrete Road Building* (120) Mar. 2.
- Concrete Road Building* (119) Mar. 2.
- Concrete Road Building* (118) Mar. 2.
- Concrete Road Building* (117) Mar. 2.
- Concrete Road Building* (116) Mar. 2.
- Concrete Road Building* (115) Mar. 2.
- Concrete Road Building* (114) Mar. 2.
- Concrete Road Building* (113) Mar. 2.
- Concrete Road Building* (112) Mar. 2.
- Concrete Road Building* (111) Mar. 2.
- Concrete Road Building* (110) Mar. 2.
- Concrete Road Building* (109) Mar. 2.
- Concrete Road Building* (108) Mar. 2.
- Concrete Road Building* (107) Mar. 2.
- Concrete Road Building* (106) Mar. 2.
- Concrete Road Building* (105) Mar. 2.
- Concrete Road Building* (104) Mar. 2.
- Concrete Road Building* (103) Mar. 2.
- Concrete Road Building* (102) Mar. 2.
- Concrete Road Building* (101) Mar. 2.
- Concrete Road Building* (100) Mar. 2.
- Concrete Road Building* (99) Mar. 2.
- Concrete Road Building* (98) Mar. 2.
- Concrete Road Building* (97) Mar. 2.
- Concrete Road Building* (96) Mar. 2.
- Concrete Road Building* (95) Mar. 2.
- Concrete Road Building* (94) Mar. 2.
- Concrete Road Building* (93) Mar. 2.
- Concrete Road Building* (92) Mar. 2.
- Concrete Road Building* (91) Mar. 2.
- Concrete Road Building* (90) Mar. 2.
- Concrete Road Building* (89) Mar. 2.
- Concrete Road Building* (88) Mar. 2.
- Concrete Road Building* (87) Mar. 2.
- Concrete Road Building* (86) Mar. 2.
- Concrete Road Building* (85) Mar. 2.
- Concrete Road Building* (84) Mar. 2.
- Concrete Road Building* (83) Mar. 2.
- Concrete Road Building* (82) Mar. 2.
- Concrete Road Building* (81) Mar. 2.
- Concrete Road Building* (80) Mar. 2.
- Concrete Road Building* (79) Mar. 2.
- Concrete Road Building* (78) Mar. 2.
- Concrete Road Building* (77) Mar. 2.
- Concrete Road Building* (76) Mar. 2.
- Concrete Road Building* (75) Mar. 2.
- Concrete Road Building* (74) Mar. 2.
- Concrete Road Building* (73) Mar. 2.
- Concrete Road Building* (72) Mar. 2.
- Concrete Road Building* (71) Mar. 2.
- Concrete Road Building* (70) Mar. 2.
- Concrete Road Building* (69) Mar. 2.
- Concrete Road Building* (68) Mar. 2.
- Concrete Road Building* (67) Mar. 2.
- Concrete Road Building* (66) Mar. 2.
- Concrete Road Building* (65) Mar. 2.
- Concrete Road Building* (64) Mar. 2.
- Concrete Road Building* (63) Mar. 2.
- Concrete Road Building* (62) Mar. 2.
- Concrete Road Building* (61) Mar. 2.
- Concrete Road Building* (60) Mar. 2.
- Concrete Road Building* (59) Mar. 2.
- Concrete Road Building* (58) Mar. 2.
- Concrete Road Building* (57) Mar. 2.
- Concrete Road Building* (56) Mar. 2.
- Concrete Road Building* (55) Mar. 2.
- Concrete Road Building* (54) Mar. 2.
- Concrete Road Building* (53) Mar. 2.
- Concrete Road Building* (52) Mar. 2.
- Concrete Road Building* (51) Mar. 2.
- Concrete Road Building* (50) Mar. 2.
- Concrete Road Building* (49) Mar. 2.
- Concrete Road Building* (48) Mar. 2.
- Concrete Road Building* (47) Mar. 2.
- Concrete Road Building* (46) Mar. 2.
- Concrete Road Building* (45) Mar. 2.
- Concrete Road Building* (44) Mar. 2.
- Concrete Road Building* (43) Mar. 2.
- Concrete Road Building* (42) Mar. 2.
- Concrete Road Building* (41) Mar. 2.
- Concrete Road Building* (40) Mar. 2.
- Concrete Road Building* (39) Mar. 2.
- Concrete Road Building* (38) Mar. 2.
- Concrete Road Building* (37) Mar. 2.
- Concrete Road Building* (36) Mar. 2.
- Concrete Road Building* (35) Mar. 2.
- Concrete Road Building* (34) Mar. 2.
- Concrete Road Building* (33) Mar. 2.
- Concrete Road Building* (32) Mar. 2.
- Concrete Road Building* (31) Mar. 2.
- Concrete Road Building* (30) Mar. 2.
- Concrete Road Building* (29) Mar. 2.
- Concrete Road Building* (28) Mar. 2.
- Concrete Road Building* (27) Mar. 2.
- Concrete Road Building* (26) Mar. 2.
- Concrete Road Building* (25) Mar. 2.
- Concrete Road Building* (24) Mar. 2.
- Concrete Road Building* (23) Mar. 2.
- Concrete Road Building* (22) Mar. 2.
- Concrete Road Building* (21) Mar. 2.
- Concrete Road Building* (20) Mar. 2.
- Concrete Road Building* (19) Mar. 2.
- Concrete Road Building* (18) Mar. 2.
- Concrete Road Building* (17) Mar. 2.
- Concrete Road Building* (16) Mar. 2.
- Concrete Road Building* (15) Mar. 2.
- Concrete Road Building* (14) Mar. 2.
- Concrete Road Building* (13) Mar. 2.
- Concrete Road Building* (12) Mar. 2.
- Concrete Road Building* (11) Mar. 2.
- Concrete Road Building* (10) Mar. 2.
- Concrete Road Building* (9) Mar. 2.
- Concrete Road Building* (8) Mar. 2.
- Concrete Road Building* (7) Mar. 2.
- Concrete Road Building* (6) Mar. 2.
- Concrete Road Building* (5) Mar. 2.
- Concrete Road Building* (4) Mar. 2.
- Concrete Road Building* (3) Mar. 2.
- Concrete Road Building* (2) Mar. 2.
- Concrete Road Building* (1) Mar. 2.

Railroads—(Continued).

- The Creeping of Rails and Its Prevention.* Biedermann. (From *Zeitung des Vereins deutscher Eisenbahnverwaltungen*.) (88) Mar.
- Modern British Restaurant Car Services.* Voyageur. (From the *Railway Magazine*.) (88) Mar.
- Tank Locomotive for Sharp Curves.* J. Kempf. (From *Annalen für Gewerbe und Bauwesen*.) (88) Mar.
- Signal Glass. William Churchill. (65) Mar.
- Helicoidal Superheaters and Squirrel-Cage Superheater on the Mestre System.* (88) Mar.
- The Marking of Level Crossings.* (From *Annalen für Gewerbe und Bauwesen*.) (88) Mar.
- Steel Freight Car Repair Shops.* E. T. Spidy. (25) Mar.
- St. Louis, Peoria & North Western Ry.* (87) Mar.
- The Valuation of Railroads. F. G. Jonah. (Paper read before the Engrs.' Club of St. Louis.) (1) Mar.
- A 185-Mile Railway Project, Proposed Extension of Temiskaming & Northern Ontario Ry. to James Bay. (86) Mar. 4.
- Protecting the Loetschberg Tunnel South Approach from Snowslides.* (13) Mar. 5.
- Continuous-Rail Track Crossing.* (13) Mar. 5.
- The Martigny-Orsières Electric Railway.* (26) Mar. 6.
- Recent Locomotives in Sweden.* (23) Mar. 6.
- Derailment Through a Broken Tyre.* (23) Mar. 6.
- The Track Elevation Subways in Chicago.* W. S. Lacher. (15) Mar. 6.
- High-Speed Electric Passenger Locomotives.* (15) Mar. 6.
- Union Station and Track Elevation at Wichita.* C. J. Skinner. (15) Mar. 6; (13) Mar. 26.
- Anthracite Burning Pacific Type Locomotive.* (15) Mar. 6.
- Report of Swiss Electrification Commission.* J. Reyval. (Abstract of translation from *La Lumière Electrique*.) (17) Mar. 7.
- Hydraulic Grading for Railroad Embankment, Suction Dredges at Rome, N. Y., Excavate Barge Canal Prism and Pump Spoil into Fill of 1 800 000 Cubic Yards for New York Central Road.* (14) Mar. 7.
- Fuel Oil Storage and Distributing Facilities, Canadian Pacific Ry.* (18) Mar. 7.
- Pacific and Mountain Type Locomotives, C. R. I. & P. Ry. (18) Mar. 7.
- Shop Improvements of the C. & E. I. R. R., Yard Center, Ill.* (18) Mar. 7.
- Heavy Railway Electrification in North America and on the European Continent.* Philip Dawson. (23) Mar. 13.
- Double-Ender Tank Locomotives, New South Wales Government Railways.* (23) Mar. 13.
- Hollerith's Electric Tabulating System for the Mechanical Tabulation of Engine Mileage, Lancashire & Yorkshire Railway.* (23) Mar. 13.
- Studies in Operation, St. Louis & San Francisco.* (15) Mar. 13.
- Steel Passenger Cars. F. M. Brinckerhoff. (Abstract of paper read before the New England Railroad Club.) (15) Mar. 13.
- The Chicago, Milwaukee & St. Paul Accounting Case. (15) Mar. 13.
- Method of Preparation of Burnt Clay Ballast (for Railroads).* J. C. Harvey. (15) Mar. 13.
- The Construction and Maintenance of Track Scales. (Abstract of Report of Committee of the Am. Ry. Bridge and Bldg. Assoc.) (15) Mar. 13.
- Organizing for Important Track Elevation Work (Chicago, Rock Island & Pacific).* (15) Mar. 13.
- The New Michigan Central Yard at Detroit.* (15) Mar. 13.
- Electric Operation of Butte, Anaconda & Pacific Railway.* (14) Mar. 14; (111) Mar. 14; (17) Mar. 14; (27) Mar. 14; (16) Mar. 14; (15) Mar. 13.
- Alberta Central Railway.* J. Grant Macgregor. (14) Mar. 14.
- Electrification of the Canadian Northern Montreal Tunnel and Terminal.* W. C. Lancaster. (17) Mar. 14; (14) Mar. 28.
- Construction of the Western Maryland Ry. Extension from Cumberland to Connellsville.* (18) Mar. 14.
- Future Tie Material in the United States.* H. H. Gibson. (Paper read before the Am. Wood Preservers' Assoc.) (18) Mar. 14.
- Electric Locomotives.* F. Lydall. (77) Mar. 16.
- The Cascade Induction Motor.* L. J. Hunt. (77) Mar. 16.
- Longitudinal Railway of Chill.* E. H. Drury. (96) Mar. 19.
- The Complicated Terminal Problem of Chicago. W. H. Lyford. (Paper read before the Traffic Club.) (15) Mar. 20.
- Rebuilding 275 Miles of Milwaukee's Line in Iowa.* (15) Mar. 20; (18) Mar. 21.
- Car for Pneumatic Placing of Tunnel Lining, C. B. & Q. Railroad to Use Special Outfit for 1 000-Foot Bore.* (14) Mar. 21; (18) Mar. 28.
- Speeds of Trains on Curves and Turnouts, Discussion of Relative Effect of Centrifugal Force on Flat Switches and on Smooth Curves with High-Speed Super-elevation.* (14) Mar. 21.

*Illustrated.

Railroads—(Continued).

- Electric Locomotive Shops for the New Haven.* (17) Mar. 21.
 Coaling Station of the C., B. & Q. R. R. at Wray, Colo.* (18) Mar. 21.
 Simplified Formulas for Computing Car Clearance on Curves.* George Paaswell. (86) Mar. 25.
 A New Design of 1500-Volt Direct-Current Locomotive; Piedmont & Northern Ry. Lines.* (13) Mar. 26; (17) Mar. 14; (15) Mar. 20.
 The Railways of the Argentine Republic.* F. Lavis. (15) Serial beginning Mar. 27.
 Analysis of Steam Train Resistance.* H. A. Houston. (15) Mar. 27.
 The Pennsylvania's Fight with the Snow.* (15) Mar. 27.
 New Norfolk & Western Coal Pier at Norfolk, Va.* (15) Mar. 27.
 Montreal & Southern Counties Railway.* (17) Mar. 28.
 Electrification.* Emil Huber-Stockar. (17) Mar. 28.
 Improvements and Betterments of the Pennsylvania R. R. (18) Mar. 28.
 Projet de Tunnel sous la Manche.* James Boudet. (35) Mar.
 Le Matériel Roulant des Chemins de Fer à l'Exposition Universelle et Internationale de Gand 1913.* M. A. Schubert et M. A. Jacquet. (38) Mar.
 Die Schienenstossverbindung von Enax.* (48) Feb. 7.
 Das neue Empfangsgebäude auf dem Hauptbahnhof in Darmstadt.* (40) Serial beginning Feb. 7.
 Nachtrag zur Ausführungsanweisung vom 13. August 1898 zu dem Gesetz über Kleinbahnen und Privatanschlussbahnen von 28. Juli 1892—mit Gültigkeit vom 1. April 1914 ab.—* (40) Feb. 18.
 Riesen-Betonsteine für Tunnelbauten.* (80) Feb. 19.
 Die elektrischen Vorortbahnen Bonn-Siegburg und Bonn-Königswinter.* Brugsch. (51) Serial beginning Feb. 21.
 Die neuen Hauptbahnhöfe der Pennsylvania und der Newyork-Zentralbahn in Newyork.* v. Elitz-Rübenach. (40) Serial beginning Feb. 25.
 Die Elektrisierung der Vorortbahn Stockholm-Saltsjöbaden.* F. F. son Holmgren. (41) Serial beginning Feb. 26.
 Statische und dynamische Oberbau-Beanspruchungen.* Heinrich Pihera. (102) Serial beginning Mar. 1.
 Benzol-electrische Drehkranlocomotive.* G. Simon. (102) Mar. 1.
 Die neuen Dreieck-Vorsignale und Durchfahrtsignale der Schwedischen Staatsbahnen.* Hans A. Martens. (102) Mar. 1.
 Ueber Triebwerkbeanspruchung bei elektrischen Lokomotiven, mit besonderer Berücksichtigung des Kurbelantriebs.* W. Kummer. (107) Mar. 14.

Railroads, Street.

- Notes on City-Passenger-Transportation in the United States.* George Duncan Snyder. (63) Vol. 193.
 Methods of Determining Standard Cross-Section and of Fixing Length of Spirals for the Main Street Subway, Cambridge, Mass.* Frank H. Carter, Assoc. M. Am. Soc. C. E. (86) Dec. 10.
 Suggested Design for Reinforced Concrete Trolley Line Pole.* Am. Elec. Ry. Assoc. (86) Mar. 4.
 Shoring and Underpinning Elevated Railroad Columns, Method of Support Adopted to Permit Excavation for New Subways.* (14) Mar. 7.
 New Carhouse and Shops at Edmonton, Alberta.* W. T. Woodroffe. (17) Mar. 7.
 Stepless Double-Deck Car for Columbus, Ohio.* Arthur St. George Joyce. (17) Mar. 14.
 Details of Beveled-Tie Practice on Elevated Structures.* M. Bernard. (17) Mar. 14.
 Report of Philadelphia Transit Commission, Investigation and Recommendations for \$57 000 000 Subway and Elevated Lines by Commissioner A. Merritt Taylor and Ford, Bacon & Davis, Consulting Engineers.* (14) Mar. 14.
 The Proposed Subway System for Providence, R. I.* (13) Mar. 19.
 Board Reports on Electrolysis Conditions in Springfield, Ohio.* (14) Mar. 21.
 The Motor Repair Shop of the Third Avenue Railway, New York.* R. H. Parsons. (17) Mar. 21.
 Maintenance Costs and Records with Single Phase Equipment. (17) Mar. 21.
 The Best Trolley Wire. G. H. McKelway. (17) Mar. 21.
 Low-Level End-Entrance Car of the Third Avenue Railway.* (17) Mar. 28.
 Les Transports en Commun à New-York et dans les Grandes Villes américaines.* P. Labordère. (33) Feb. 21.
 Truck radial pour Voitures de Tramways.* (34) Mar.

Sanitation.

- The Drainage of the Fens.* Richard F. Grantham. (75) July.
 Modern Pumping Machinery for Drainage of the Fens.* Richard W. Allen. (75) July.
 The Drainage of the River Ouse Basin.* E. G. Crocker. (75) July.

Sanitation—(Continued)

- The Design, Construction and Cost of the Institutional Sewage Treatment Plant at Hillside Home, Clark's Summit, Pa.* C. M. Hartley. (86) Dec. 10.
- Some Observations Upon the Preparatory Treatment of Sewage with Special Reference to California Conditions. Charles Gilman Hyde. (Paper read before the League of California Municipalities.) (86) Dec. 10.
- The Building of Sanatoria.* (104) Feb. 20.
- A Few Notes on Twenty Years' Work in a Great City (Manchester).* T. De Courcy Meade. (104) Feb. 27.
- A Self-Cleaning Screen for Sewage and Trade Wastes.* (105) Mar.
- Water Supply and Sewerage Systems of the U. S. Naval Training Station, Great Lakes, Ill.* (13) Mar. 5.
- Sewage Disposal and Works Management. John E. Farmer. (Abstract of paper read before the Inst. of San. Engrs.) (104) Mar. 6.
- Combination Heating in Large Dwellings.* (101) Mar. 6.
- Distribution of Sewage on Filters.* Charles Hoopes. (14) Mar. 7.
- Drainage Ditch and Levee Tables for Level Section with Explanation of Method of Computation.* E. S. Blaine. (86) Mar. 11.
- A Regulating Device for Insuring Uniform Distribution of Tank Effluent Over Sprinkling Filters, in Successful Use at Pennypack Creek Plant, Philadelphia.* (86) Mar. 11.
- Features of Design and Financing of the Sanitary Sewerage System and Treatment Works at Vincennes, Indiana. Robert C. Wheeler. (Paper read before the Indiana Sanitary and Water Supply Assoc.) (86) Mar. 11.
- The Present Status of Sanitary Engineering. John W. Hill. (Abstract of paper read before the Ohio State Board of Health.) (96) Mar. 12.
- Semi-Elliptical Sewer Sections.* John H. Gregory. (13) Mar. 12.
- Modern Plumbing in a Unique Hotel.* (101) Mar. 13.
- Garbage Reduction Recommended for Detroit. (14) Mar. 14.
- Organization and Methods of Street Cleaning Departments. William H. Connell. (Paper read before the Students in Highway Eng., Columbia Univ.) (96) Serial beginning Mar. 19.
- The Control of Stream Pollution. Paul Hansen. (Paper read before the Illinois Academy of Science.) (96) Mar. 19.
- Poured Sewer-Pipe Joints. A. Elliott Kimberly. (13) Mar. 19.
- Furnace System for Country Church.* E. G. H. (101) Mar. 20.
- House-Piles and Disease. Edward Halford Ross. (29) Mar. 20.
- The Present Position of the Sewage Disposal Problem. Gilbert J. Fowler. (Abstract of paper read before the Liverpool Eng. Soc.) (104) Mar. 20.
- The Atlantic City Main Drainage Conduit.* T. Chalkley Hatton. (13) Mar. 26.
- Clearing Streets of a Snowbound City, Recommendations for Use of Sewers for Snow Removal and Organization of a "Snow-Fighting Force" in New York City.* John T. Fetherston. (14) Mar. 28.
- Les Mesures Sanitaires à Panama.* Imbeaux. (43) Jan.
- Ueber die Tiefenwirkung von Formaldehyddämpfen in Dampfdesinfektionsapparaten mit und ohne Einwirkung verminderten Luftdruckes.* Otto Mayer. (7) Feb. 7.
- Beitrag zur wirtschaftlichen Berechnung von Städte-Kanalisationen. R. Weyrauch. (7) Feb. 14.
- Ueber den Wert des Ozons in der Lüftung.* Milton W. Franklin. (7) Feb. 28.
- Versuche mit Formaldehyd-Vakuumdesinfektion.* Gg. Mayer. (7) Feb. 28.

Structural.

- A Method of Finding the Forces in Framed Ribs with Fixed Ends.* William Mason. (63) Vol. 193.
- The Preservation of Wood.* A. J. Wallis-Taylor, Assoc. M. Inst. C. E. (29) Feb. 20.
- The Biltmore Hotel.* H. Gage Balcom. (36) Mar.
- Exterior Plastering Specifications.* (Recommended by Assoc. of Metal Lath Mfrs.) (67) Mar.
- The Waterproofing and Dampproofing of Concrete. Geo. P. Dieckmann. (67) Mar.
- A Comparison of the Physical Properties of Alloy Steel. E. O. Allen. (108) Mar.
- Graphical Design of Eccentrically Loaded Columns.* H. B. Cooley. (86) Mar. 4.
- Design of a Built-In Brick Chimney.* George L. Jensen. (13) Mar. 5.
- Consulting Engineer's Report on Concrete Work, League Island Park, Philadelphia.* (13) Mar. 5.
- Commercial Red Lead for Painting Structural Steel. A. Gordon Spencer. (96) Mar. 5.
- Limitation of Building Heights, Arguments Advanced against the Proposal Made in Chicago to Substitute a 260-Foot for the Present 200-Foot Limit. (14) Mar. 7.

*Illustrated.

Structural—(Continued).

- Tests of Concrete. Sanford E. Thompson. (Report of Comm. to Am. Concrete Inst.) (14) Mar. 7.
- Internal Stresses; with Application to Reinforced-Concrete Beams.* Charles A. Gilchrist. (13) Serial beginning Mar. 12.
- The Application of Brick in Engineering Work. E. E. R. Tratman. (Abstract of paper read before the Natl. Brick Mfrs. Assoc.) (13) Mar. 12.
- Erecting a Heavy Warehouse with Steel Columns and Girderless Concrete Floors.* Peter B. Sheridan. (13) Mar. 12.
- Decay of Iron and Steel in Engineering Works. W. H. Maxwell. (Abstract of paper read before the Institution of Mun. and County Engrs.) (96) Mar. 12.
- Calculations and Details for Steel-Frame Buildings from the Draughtsman's Standpoint. W. Cyril Cocking. (Abstract of paper read before the Concrete Inst.) (104) Mar. 13.
- Erecting an Armory Roof to Cover Unobstructed Floor 600 x 300 Feet.* (14) Mar. 14.
- An Earthquake-Proof Tower, Semi-Flexible Construction Selected for Steel and Concrete Structures, 303 Feet High, at Berkeley, California.* Erle L. Cope. (14) Mar. 14.
- Some Features of a Loft Building in Chicago.* Harold Doerr. (86) Mar. 18.
- Design Features of a 220-ft. Reinforced Concrete Block Chimney at Penarth, Wales.* John W. Rodger. (From *Concrete and Constructional Engineering*.) (86) Mar. 18.
- Tests of Some Joints Used in Heavy Timber Framing.* H. D. Dewell. (13) Serial beginning Mar. 19.
- Special Features of a Concrete Building.* (13) Mar. 19.
- Temperature Measurements on a Concrete Building.* (14) Mar. 19.
- Action of Sea Water on Concrete, Results of Six-Year Test of Twenty-Three Molded Piles of Various Mixtures Submerged in Boston Harbor and Withdrawn Periodically for Examination. (14) Mar. 21.
- Gasolders with Curved Tanks.* (24) Mar. 23.
- Fire Hazard Created by Chimney Defects.* (101) Mar. 27.
- Yale Stadium to Seat 61 000 Spectators.* (14) Mar. 28.
- Essai d'Exposé de la Théorie d'Euler (Pièces chargées de bout).* Paul Raes. (31) 1913, Pt. 6.
- La Couverture des Rampants de Pignon.* M. de Vaere. (31) 1913, Pt. 6.
- Action de la Chaleur et des Fumées de Fours sur les Briques Silico-Calcaires.* Emillo Damour. (93) Feb.
- Recherche de la Hauteur et de l'Ecartement Economique des Poutres d'un Plancher en Ciment Armé. N. de Tedesco. (33) Mar. 14.
- Die Ergebnisse von Versuchen zur Ermittlung der Druckfestigkeit von unbewehrten Betonsäulen bei verschiedener Höhe derselben.* C. Bach. (51) Sup. No. 5.
- Neuere Ausführungen und Erfahrungen mit Eisenbeton-Schornsteinen.* Ernst Schlick. (51) Serial beginning Sup. No. 5.
- Ueber die Gefährlichkeit von Näherungsberechnungen Statisch Unbestimmter Systeme.* Friedrich Hartmann. (69) Feb.
- Die Berechnung Statisch Unbestimmter Systeme.* Pirlet. (69) Feb.
- Ein neues Verfahren zur Berechnung von Druckstäben auf Knicken. (Für Schweisseisen, Flusseisen, Stahlguss, Flussstahl, Holz und Gusseisen.) Torbjörn Strand. (40) Serial beginning Feb. 7.
- Ueber die Brauchbarkeit des Federmanometers für die Messung grosser Kräfte im Materialprüfungswesen.* A. Martens. (48) Serial beginning Feb. 7.
- Einrichtung von Kunststeinfabriken.* (80) Feb. 19.
- Senkung des Grundwasserspiegels bei Gründung von Bauwerken.* (40) Serial beginning Feb. 21.
- Die Selbstkostenberechnung von Ziegelerzeugnissen. S. Neuwohner. (80) Feb. 24.
- Schornsteinradialziegel.* (80) Feb. 26.
- Einseitig belastete Eisenbetonquerschnitte.* O. Henkel. (80) Feb. 26.
- Die Elastische Durchbiegung Kontinuierlicher Beliebiger Belasteter Träger.* W. Frank. (69) Mar.
- Modellbauten und Lichtbilder, ihre Bedeutung für Schule und Praxis.* C. Kersten. (69) Mar.
- Knotenverschiebungen Ebener Fachwerke bei Veränderlicher Lastrichtung.* Ivan Arnovljevic. (69) Mar.
- Zweite Maschinenhalle auf der Leipziger Baufach-Ausstellung 1913.* Franz Czech. (69) Mar.
- Die neue Bauordnung für Cöln a. Rh. Ehlgötz. (39) Mar. 5.
- Versuche mit drabtbewehrten Betonplatten.* O. Gottschalk. (78) Mar. 5.
- Zur Kostenberechnung von Beton verschiedener Mischungen. John Berlowitz. (78) Mar. 5.
- Eisenbetonschornsteine mit Dissipatoraufsätzen. H. Winkelmann. (78) Mar. 5.
- Der Kuppelbau im Neubau des Königl. bayerischen Verkehrsministeriums.* Georg Eichbauer. (78) Serial beginning Mar. 5.
- Ueber die Besonnung eines Zimmers durch eine vertikale Fensterscheibe.* C. Schoy. (7) Mar. 7.

*Illustrated.

Structural—(Continued).

- Beitrag zur Vornahme von Probe-Belastungen im Eisenbetonbau.* Fritz Hübner. (107) Mar. 7.
 Das neue Bremer Schauspielhaus.* Albert Prokesch. (78) Mar. 17.
 Erweiterungsbau der katholischen Kirche (Liebfrauenkirche) in Bocholt in Westfalen.* G. Rodermann. (78) Mar. 17.
 Ueber das Fliesen und die inneren Spannungen bei gedrückten und gezogenen Stäben.* W. Tafel. (50) Serial beginning Mar. 19.

Topographical.

- Standard Railway Property Maps and Profiles Prescribed by the Interstate Commerce Commission.* (86) Mar. 4.
 A Method of Determining the Area of Cross-Sections.* C. D. Norton. (96) Mar. 12.
 The Determination of the Magnetic Declination, Dip and Total Force in Western Canada. (96) Mar. 12.
 The Ohio River Survey. G. C. Graeter. (Abstract of paper read before the Indiana Eng. Soc.) (13) Mar. 19.
 New Coast and Geodetic Survey Theodolite-Magnetometer.* Frank Waldo. (13) Mar. 5.

Water Supply.

- Water-Supply for California Oilfields.* Arthur William Purchas. (63) Vol. 193.
 The Design and Construction of a 100 000 Imp. Gal. Reinforced Concrete, Elevated Water Tank at Park Hill, Ontario.* (86) Dec. 10.
 Recommended Procedure in Laying Machine Banded Wood Stave Pipe.* (86) Dec. 10.
 Some Features of the Design and Construction of a 5 000 000 Imp. Gal. Circular Reinforced Concrete Reservoir at Regina, Sask. (86) Dec. 10.
 The Fluxograph Flow-Recorder.* (11) Feb. 27.
 Parr Shoals Power Development for Columbia, S. C.* George G. Shedd. (60) Mar.
 The Design of Shafts in Earth for the City Tunnel of the Catskill Aqueduct.* R. M. Eiegel. (36) Mar.
 Digest of Court Decisions of Controversies Between Water Companies and Individuals Claiming Damage by Polluted Water. H. E. Barnard. (Paper read before the Indiana State Board of Health.) (86) Mar. 4.
 Water Supply and Sewerage Systems of the U. S. Naval Training Station, Great Lakes, Ill.* (13) Mar. 5.
 Water Powers of Manitoba. (96) Mar. 5.
 Report on Ottawa River as Source of Supply for City of Ottawa.* Archibald Currie. (Report to the City of Ottawa.) (96) Mar. 5.
 Montreal Water Supply Conduit.* (Abstract of report of the Board of Commrs. of the City of Montreal.) (96) Mar. 5.
 Auglaize Power Development No. 1, First Plant of a Series of Four Low-Head Water Powers Ultimately to Generate from 28 000 to 30 000 Kilowatts.* Reginald Trautschold. (14) Mar. 7.
 Repairing Montreal Water-Supply Conduit, Steel Pipe Section to Close Hole 60 Feet Long in a 9-Foot Reinforced-Concrete Low-Pressure Aqueduct. (14) Mar. 7; (13) Mar. 12.
 Specifications for Plant and Material to Sterilize the Buffalo Water Supply by Hypochlorite of Lime or Liquid Chlorine as an Alternative. (86) Mar. 11.
 Design and Construction of a Reinforced Concrete Fence for Reservoir Protection at Allegheny County Home, Woodville, Pa.* (86) Mar. 11.
 Linings for Small Storage Reservoirs. C. R. Sessions. (86) Mar. 11.
 Collapse of a Portion of the Antelope Valley Steel Siphon, Los Angeles Aqueduct.* William Mulholland. (13) Mar. 12.
 Lowering Groundwater by Pumping to Lay Pipe in Quicksand. W. W. Brigden. (Abstract of paper read before the Mich. Eng. Soc.) (13) Mar. 12.
 The New Water Supply for the City of New York.* Charles Prellin. (11) Serial beginning Mar. 13.
 Experiences with Wood-Stave Pipe. Elbert M. Chandler. (Abstract of paper read before the Washington Irrigation Inst.) (14) Mar. 14.
 Break and Repair of Montreal Conduit.* J. A. Jamieson, R. S. Lea and G. R. Heckle. (14) Mar. 14.
 Broken Water Main Causes Building Collapse at Springfield.* Elbert E. Lochridge. (14) Mar. 14.
 Hydro-Electric Plants of the Tennessee Power Co.* Warren O. Rogers. (64) Mar. 17.
 The Relation of Out-of-Pocket Cost to Water Rate Making, with an Illustrative Example.* Morris Knowles and Maurice R. Scharff. (Abstract of paper read before the Illinois Water Supply Assoc.) (86) Mar. 18.

*Illustrated.

Water Supply—(Continued).

- Water-Supply Projects in Cleveland, Ohio. (13) Mar. 19.
 St. Louis Builds World's Largest Mechanical Filter Plant.* Edward E. Wall. (Abstract of paper read before the Ill. Water Supply Assoc.) (14) Mar. 21; (86) Mar. 18.
- Highest-Head Hydroelectric Plant East of Mississippi River.* Charles G. Adsit and Eugene Lauchli. (14) Serial beginning Mar. 21.
- The Necessity for State Supervision of Water Works Operation. Allan J. McLaughlin. (Paper read before the Illinois Water Supply Assoc.) (86) Mar. 25.
- Désign, Construction and Operation of the Iron Removal Plant of the Champaign and Urbana Water Company.* A. N. Talbot. (Paper read before the Illinois Water Supply Assoc.) (86) Mar. 25.
- Economic and Service Advantages of Pumping Public Water Supplies by Electricity. J. M. Bryant. (Paper read before the Illinois Water Supply Assoc.) (86) Mar. 25.
- Reinforced-Concrete Filter Chamber for Coatesville Water Purification Plant.* (13) Mar. 26.
- Cross-Sectioner for Circular Conduit.* Arthur W. Tidd. (13) Mar. 26.
- Present Status of Flood-Prevention Studies at Dayton.* (14) Mar. 28.
- Reconstruction of the Elwha River Dam. Victor H. Reineking. (14) Mar. 28.
- Hoppes V-Notch Meter Recorder and Integrator.* (64) Mar. 31.
- Distribution d'Eau de la Ville de Toulon; Construction du Barrage de Dardennes.* Bouton, Veilhan et Mercier. (43) Jan.
- Ruptures de Barrages aux Etats-Unis, Barrage es Béton Armé de la Stony River (Virginie); Barrage en Terre du Horse Creek (Colorado).* (33) Mar. 7.
- L'Irrigation de la Mésopotamie, le Barrage d'Hindia, sur l'Euphrate.* P. Calfas. (33) Mar. 14.
- Turbines Hydrauliques de l'Usine Electrique d'Augst, sur le Rhin (Suisse).* (33) Mar. 14.
- Eisenbeton-Doppelprofil-Kanal für die Wasserversorgungs-Anlage zum Elektrizitäts-Aussenwerk am Holsteiner-Damm in Königsberg i. Pr.* Lewe. (51) Serial beginning Sup. 4.
- Versuche über Druckverluste in Eisenbetonvohrleitungen.* A. Budau. (53) Feb. 20.
- Ein einfaches, genaues und zuverlässiges Verfahren der quantitativen Bestimmung von Blei im Trinkwasser. C. Reese und J. Drost. (7) Feb. 21.
- Die Wasserversorgung der Stadt Nürnberg.* Leo Walther. (51) Serial beginning Mar. 7.
- Ueber Wassersterilisierung mittels ultravioletter Strahlen des Quecksilberdampflichtbogens.* F. A. Ebert. (7) Mar. 7.

Waterways.

- Durban Harbour, South Africa.* Cathcart William Methven. (63) Vol. 193.
- Natal Harbour-Works. Charles James Crofts. (63) Vol. 193.
- A New Canal at Southall.* (12) Feb. 20.
- The Overhead Wharf Crane.* Harry Sawyer. (95) Mar.
- Concrete Docks versus Wooden Docks. Harrison S. Taft. (95) Mar.
- River Terminals for Inland Cities.* H. McL. Harding. (95) Mar.
- New Municipal Pier in Philadelphia.* (95) Mar.
- New London Harbor Improvement Project.* William T. Donnelly. (95) Mar.
- The Navy and the Panama Canal. Harry S. Knapp. (From *Proceedings*, United States Naval Inst.) (44) Mar.
- The Strategic Aspect of the Panama Canal.* Vaughan Cornish. (44) Mar.
- Engineering Lessons from the Ohio Floods.* John W. Alvord, M. Am. Soc. C. E. (109) Mar.
- New Canal and Locks at "The Soo".* (13) Mar. 5.
- A Great Brass Brain (United States Tide Predicting Machine).* C. H. Claudy. (46) Mar. 7.
- Navigating Lights for the Panama Canal.* (46) Mar. 7.
- How the Locks of the Panama Canal Are Operated.* (46) Mar. 7; (73) Jan. 23; (47) Mar. 13.
- The Black Warrior River Lock and Dam.* Harry Chapin Plummer. (19) Mar. 7.
- New 15-Cu. Yd. Dipper Dredges for the Panama Canal.* (13) Mar. 12.
- Saskatchewan River in Manitoba.* (96) Mar. 12.
- Driving Foundation Piles with a Follower. (14) Mar. 14.
- Building the Dalles-Cello Ship Canal on the Columbia River.* (14) Mar. 14.
- Pier Construction at Baltimore. (14) Mar. 14.
- Flood Prevention and Protection from the Point of View of the Federal Government. J. C. Oakes. (Abstract of paper read before the Indiana Sanitary and Water Supply Assoc.) (86) Mar. 18.
- Reconstruction of the Mississippi River Levee at Helena, Ark.* C. H. Purvis. (13) Mar. 19.

Waterways—(Continued).

- The Ohio River Survey. G. C. Graeter. (13) Mar. 19.
 Curbing the Mississippi.* James R. Crowe. (19) Mar. 28.
 Dynamiting Ice Jams. Arthur La Motte. (14) Mar. 28.
 La Consolidation des Berges des Canaux et Rivières par Ferrés en Dalles de
 Beton et en Bétons Malgres Damés sur Place.* C. Geeraert et P. Glaudot.
 (30) Feb.
 Installations Mécaniques du Canal de Berlin à Stettin Ecluses; Halage des Bateaux;
 Portes de Garde.* (33) Feb. 14.
 Der Unfall an der Schleppzugschleuse in Hemelingen-Bremen, dessen Ursachen und
 die Wiederherstellung der Schleuse.* O. Franzius. (40) Serial beginning
 Feb. 28.
 Die Hochbrücke über den Kaiser Wilhelm-Kanal bei Rendsburg.* G. Chr. Mehrrens.
 (69) Mar.
 Ueber die Melioration der Tiefebene von Ravenna.* Karl Heller. (39) Mar. 5.
 Ufermauer aus Eisenbetonplatten.* Richard Krauss. (78) Mar. 17.

*Illustrated.

CIVIL ENGINEERS

JANUARY 1914

VOL. XL No. 1

1914

PUBLISHED BY THE AMERICAN SOCIETY OF CIVIL ENGINEERS

Published under the patronage of the American Society of Civil Engineers, and
 the British Association of Engineers, and the Institution of Mechanical Engineers.

PUBLISHED BY THE AMERICAN SOCIETY OF CIVIL ENGINEERS

PUBLISHED BY

Volume XL No. 1
 Price 100 Cents

JANUARY 1914

Published according to the order of the Board of Directors of the American Society of
 Civil Engineers, and the British Association of Engineers, and the Institution of Mechanical Engineers.